Physical activity practice during COVID-19 pandemic in patients with intermittent claudication

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SUMMARY

OBJECTIVE: To describe physical activity habits and barriers for physical activity practice in patients with peripheral artery disease and claudication symptoms during Coronavirus 2019 (COVID-19) pandemic.

METHODS: In this cross-sectional survey study, 127 patients with peripheral artery disease (59.8% men; 68±9 years old; and 81.9% had the peripheral artery disease diagnosis ≥5 years old) were included. The physical activity habits and barriers for physical activity practice were assessed through telephone interview using a questionnaire with questions related to: (a) COVID-19 personal care; (b) overall health; (c) physical activity habits; (d) for those who were inactive, the barriers for physical activity practice.

RESULTS: Only 26.8% of patients reported practicing physical activity during the COVID-19 pandemic. Exercise characteristics more common among these patients include walking, performed at least 5 days a week, during 31–60 min at light intensity. In contrast, among physically inactive patients, pain, injury or disability (55%), the COVID-19 pandemic (50%), the need to rest due to leg pain (29%), and lack of energy (27%) were the most frequent barriers to physical activity practice.

CONCLUSION: The physical activity level of patients with peripheral artery disease is impacted by the COVID-19 pandemic.

KEYWORDS: Coronavirus infections. Social isolation. Intermittent claudication. Exercise.

INTRODUCTION

Peripheral artery disease (PAD) is a prevalent condition in the elderly population1 and that frequently is associated with several comorbid conditions, including hypertension, diabetes, coronary artery disease, and obesity2. In patients with PAD and claudication symptoms, function capacity is reduced, bringing aggravating the symptomatology and other comorbid conditions3,4. Physical activity practice is considered a cornerstone of clinical treatment in patients with PAD and claudication symptoms. However, most of the patients do not achieve the minimum of physical activity levels recommended by general and specific guidelines (i.e. 150 min/wk of moderate-vigorous physical activities)5. Most of the reasons for physical inactivity in these patients include claudication symptoms, difficulty in having

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places to physical activity practice, fatigue, and the presence of other diseases. In the early of 2020, the world faced an outbreak of the novel coronavirus disease, later called COVID-19, and on the 11th of March 2020, COVID-19 was characterized by World Health Organization as a pandemic. The social isolation and mobility restrictions adopted to reduce the virus spread have reduced physical activity levels in all age groups. This is even worse in high-risk groups for COVID-19, which includes elderly patients and people with chronic diseases.

In patients with PAD, the impact of COVID-19 on the practice of physical activity was not described, which limits the understanding of the magnitude of the problem and proposes strategies to cope with physical inactivity in these patients. This study aimed to describe physical activity habits and barriers to physical activity in patients with PAD and claudication symptoms during the COVID-19 pandemic.

**METHODS**

**Study design and patients**

This observational, descriptive cross-sectional survey study involved patients with PAD and claudication symptoms recruited from the database of researches previously developed by our group. This current study was approved by the local ethical committee before data collection (CAAE #31529220.8.0000.5511). Participants did not identify themselves and their answers were only included in the sample if they authorized it before the protocol started. All procedures follow the national legislation and the Declaration of Helsinki.

Patients were included if they met the following criteria:

a) agreed to participate and respond to all questions of the survey;

b) the previous diagnosis of PAD;

c) age ≥45 years old;

d) had ankle-brachial index (ABI) ≤0.90 in one or both legs, and;

e) absence of non-compressible vessels, amputated limbs and/or ulcers.

Patients were only excluded if they presented some disability during the phone call that compromises the answer to the questionnaire (i.e. cognitive, hearing, and speech).

**Data collection**

Data collection was performed through a phone interview, between May 15 and August 10, 2020, conducted by health professionals with experience in studies with patients with PAD.

**Physical activity:** To assess physical activity habits, participants were asked about: 1- “Did you practice physical activity before the pandemic?”, 2- “Are you performing some physical activity?” Answers for both questions were “Yes” or “No”. If yes, 3- “How many times are you exercising a week? (possible answers: one to seven days a week), 4 – “For how long are you exercising?” (possible answers: “less than 30 min”, “between 30 and 60 minutes”, and, “more than 60 minutes”), 5 – “What is the intensity of the physical activity?” (possible answers: low, medium/moderate or high), 6 – “What type of exercise are you doing?” (possible answers: “walking/jogging”, “functional exercise”, “resistance exercise”, “I am not exercising”, “others – open question”.

**Barriers to physical activity:** For patients who were not exercising, it was questioned “Which of the following are the main reasons for you NOT to practice physical activity?” From the list of barriers, the participant should report all that applied. (possible answers: “COVID-19 pandemic”, “some difficulty in getting to place”, “weather unfavorable”, “lack of company”, “pain”, “injury or disability”, “needing to rest because of leg pain”, “lack of physical energy”, “being afraid of hurting”, “lack of time”, “lack of knowledge”, or “other”).

**Statistical analysis**

Data were stored and analyzed using the Statistical Package for the Social Sciences (SPSS Version 20.0). Normality and homogeneity were analyzed, and parametric statistical procedures were employed. Continuous variables were summarized as mean and standard deviation, whereas categorical variables were summarized as relative frequencies.
RESULTS

The sample included 127 patients with PAD (Table 1). Patients were mostly elderly, with comorbid conditions, including hypertension (84%), dyslipidemia (80%), cardiac disease (52.8), and diabetes (46%). The majority of patients were in social isolation (89%) and three of them were infected with full recovery of COVID-19.

Table 2 shown the physical activity habits in patients with PAD. Fifth-four percent of patients reported physical activity practice before the COVID-19 pandemic and during the pandemic the number of patients reporting some physical activity practice reduced to 26.8%. Among patients that remained physically active, the more common modality was walking exercise (58.8%), performed at least 5 days a week, during 31–60 min at light intensity.

Table 3 shown the barriers to physical activity in inactive patients with PAD (n=93; 73%) during the COVID-19 pandemic. The most frequent barrier to physical activity practice was pain, injury or disability (55%), the COVID-19 pandemic (50%), the need to rest due to leg pain (29%), and lack of energy (27%).

Table 1. Clinical characteristics, co-morbidities and COVID-19 conditions of the patients with peripheral artery disease (n=127).

| Values                                      |
|---------------------------------------------|
| Gender (male), n (%)                        |
| 76 (59.8)                                   |
| Age, years                                  |
| 68±9                                        |
| Body mass index, kg/m²                      |
| 27.4±4.2                                    |
| Ankle-brachial index                        |
| 0.54±0.17                                   |
| Time of disease since diagnosis, n (%)      |
| <5 years                                    |
| 23 (18.1)                                   |
| 5–10 years                                  |
| 55 (43.3)                                   |
| >10 years                                   |
| 49 (38.6)                                   |
| Comorbidities and risk factors, n (%)       |
| Smoker                                      |
| 19 (15.0)                                   |
| Former smoker                               |
| 80 (63.0)                                   |
| Diabetes mellitus                           |
| 58 (45.7)                                   |
| Hypertension                                |
| 106 (83.5)                                  |
| Dyslipidemia                                |
| 102 (80.3)                                  |
| Obesity                                     |
| 29 (22.8)                                   |
| Cardiac disease                             |
| 67 (52.8)                                   |
| Respiratory disease                         |
| 20 (14.6)                                   |
| Regarding COVID-19, n (%)                   |
| Social isolation                            |
| 113 (89.0)                                  |
| COVID-19 diagnosis                          |
| 3 (2.4)                                     |
| Recovered from COVID-19*                    |
| 3 (100)                                     |

Data presented as mean±standard deviation, and as absolute and relative frequency. *n=3

Table 2. Physical activity habits in patients with peripheral artery disease (n=127).

| Values                                      |
|---------------------------------------------|
| Physical activity habits (n=127)            |
| Physical exercise before COVID-19           |
| 69 (54.3)                                   |
| Physical exercise during COVID-19           |
| 34 (26.8)                                   |
| Characteristics of Physical exercise currently (n=34) |
| Modalities                                  |
| Walking exercise                            |
| 20 (58.8)                                   |
| Functional exercise                         |
| 13 (38.2)                                   |
| Resistance exercise                         |
| 3 (8.8)                                     |
| Frequency (x/week)                          |
| 1–2                                         |
| 6 (17.6)                                    |
| 3–4                                         |
| 9 (26.5)                                    |
| 5–7                                         |
| 19 (55.9)                                   |
| Duration (min)                              |
| ≤30                                         |
| 9 (26.5)                                    |
| 31–60                                       |
| 19 (55.9)                                   |
| ≥61                                         |
| 6 (17.6)                                    |
| Intensity                                   |
| Light                                       |
| 17 (50.0)                                   |
| Moderate                                    |
| 14 (41.2)                                   |
| Vigorous                                    |
| 3 (8.8)                                     |

Table 3. Barriers to physical activity in sedentary patients with peripheral artery disease (n=93). Data presented as absolute and relative frequency.

| Values                                      |
|---------------------------------------------|
| COVID-19 pandemic                           |
| 46 (49.5)                                   |
| Some difficulty in getting to place         |
| 8 (8.6)                                     |
| Weather unfavorable                         |
| 3 (3.2)                                     |
| Lack of company                             |
| 2 (2.2)                                     |
| Pain, injury or disability                  |
| 51 (54.8)                                   |
| Needing to rest because of leg pain         |
| 27 (29.0)                                   |
| Lack of physical energy                     |
| 25 (26.9)                                   |
| Being afraid of hurting                     |
| 15 (16.1)                                   |
| Lack of time                                |
| 6 (6.5)                                     |
| Lack of knowledge                           |
| 2 (2.2)                                     |
| Others                                      |
| 12 (12.9)                                   |
**DISCUSSION**

The main results of this study were:

(i) the number of PAD patients who reported physical activity practice reduced more than half during the COVID-19 pandemic;

(ii) among physically inactive patients, the most reported barrier to physical activity practice were pain, injury or disability, the COVID-19 pandemic, lack of energy and the need to rest because of leg pain;

(iii) among patients that remained active, walking exercise, 5 days a week, during 31–60 min at light intensity were the most frequently reported.

Patients with PAD and symptoms of claudication are less physically active than age-matched controls, with few of them achieving the general recommendation to physical activity for the elderly (150 min/wk of moderate-vigorous physical activities). In the current study, 56% of patients reported performing some physical activities before the COVID-19 pandemic, which was reduced to only 27% during the COVID-19 outbreak. Given that physical activity can promote overall health benefits in patients with PAD, especially for promoting less pain during the exercise, which can increase adherence to the practice. The use of mobile apps, videoconferences, and other technologies could be useful to increase physical activity levels in patients with PAD. However, their feasibility and effectiveness should be tested.

This study presents limitations that should be emphasized, the main one is the use of self-reported assessments that are susceptible to information bias. To avoid direct contact with patients, the assessments were performed using phone calls, which impose additional difficulties in obtaining information. The recruited sample is part of previous studies of our group, and whether the results can be expanded to the general population is unclear.

**CONCLUSION**

The physical activity level of patients with PAD is impacted by the COVID-19 pandemic. Remote strategies to perform physical activity avoiding claudication symptoms could be useful to increase their physical activity levels during this period.

**AUTHORS’ CONTRIBUTIONS**

RMR: Conceptualization, Formal Analysis, Writing – Original Draft, Writing – Review & Editing. MAC: Conceptualization, Formal Analysis, Writing – original draft, Writing – Review & Editing. NW: Conceptualization, Writing – Original Draft, Writing – Review & Editing. GGC: Conceptualization, Formal Analysis, Writing – Original Draft, Writing – Review & Editing. HK: Conceptualization, Formal Analysis, Writing – Original Draft, Writing – Review & Editing. MDO: Data Curation, Formal Analysis, Writing – Original Draft, Writing – Review & Editing. JFC: Data Curation, Writing – Original Draft, Writing – Review & Editing. HAB: Data Curation, Writing – Original Draft, Writing – Review & Editing.
1. Cirqui MH, Aboyans V. Epidemiology of peripheral artery disease. Circ Res. 2015;116(9):1509-26. https://doi.org/10.1161/CIRCRESAHA.116.303849

2. Farah BQ, Ritti-Dias RM, Cucato GG, Chehuen Mda R, Barbosa JP, Zeratti AE, et al. Effects of clustered comorbid conditions on walking capacity in patients with peripheral artery disease. Ann Vasc Surg. 2014;28(2):279-83. https://doi.org/10.1016/j.avsg.2013.01.020

3. Gengo e Silva RC, Melo VF, Wolosker N, Consolin-Colombo FM. Lower functional capacity is associated with higher cardiovascular risk in Brazilian patients with intermittent claudication. J Vasc Nurs. 2015;33(1):21-5. https://doi.org/10.1016/j.jvnn.2014.08.001

4. Lamberti N, Lopez-Soto PJ, Guerzoni F, Napoli N, Gasbarro V, Zimmermann P, et al. Changes in exercise capacity and risk of all-cause mortality in patients with peripheral artery disease: a 10-year retrospective cohort study. Intern Emerg Med. 2020;15(2):289-98. https://doi.org/10.1007/s11739-019-02176-3

5. Gerage AM, Correia MA, Oliveira PML, Palmeira AC, Domingues WJR, Zeratti AE, et al. Physical activity levels in peripheral artery disease patients. Arq Bras Cardiol. 2019;113(3):410-6. https://doi.org/10.5935/abc.20190142

6. Barbosa JP, Farah BQ, Chehuen M, Cucato GG, Farias Júnior JC, Wolosker N, et al. Barriers to physical activity in patients with intermittent claudication. Int J Behav Med. 2015;22(1):70-6. https://doi.org/10.1007/s12529-014-9408-4

7. Cavaclante BR, Farah BQ, Barbosa JPA, Cucato GG, Chehuen MR, Santana FS, et al. Are the barriers for physical activity practice equal for all peripheral artery disease patients? Arch Phys Med Rehabil. 2015;96(2):248-52. https://doi.org/10.1016/j.apmr.2014.09.009

8. Sousa ASA, Correia MA, Farah BQ, Saes G, Zeratti AE, Puech-Leao P, et al. Barriers and levels of physical activity in patients with symptomatic peripheral artery disease: comparison between women and men. J Aging Phys Act. 2019;27(5):719-24. https://doi.org/10.1123/japa.2018-0206

9. Pan A, Liu L, Wang C, Guo H, Hao X, Wang Q, et al. Association of public health interventions with the epidemiology of the COVID-19 outbreak in Wuhan, China. JAMA. 2020;323(19):1915-23. https://doi.org/10.1001/jama.2020.6130

10. World Health Organization. Coronavirus disease 2019 (COVID-19): situation report, 51. Geneva: World Health Organization; 2020. [cited on Aug. 18, 2020]. Available from: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports

11. López-Sánchez GF, López-Bueno R, Gil-Salmerón A, Zauber R, Skalska M, Jastrzębska J, et al. Comparison of physical activity levels in Spanish adults with chronic conditions before and during COVID-19 quarantine. Eur J Public Health. 2021;31(1):161-6. https://doi.org/10.1093/eurpub/ckaa159

12. Ruiz-Rosó MB, Knott-Torcal C, Matínez-Escalante DC, Garmán A, Sampedro-Nuñez MA, Dávalos A, et al. COVID-19 lockdown and changes of the dietary pattern and physical activity habits in a cohort of patients with type 2 diabetes mellitus. Nutr facts. 2020;12(8):2327. https://doi.org/10.3390/nu12082327

13. Calvancante BR, Ritti-Dias RM, Soares AH, Lima AH, Correia MA, Mattos LD, et al. A single bout of arm-crank exercise promotes positive emotions and post-exercise hypotension in patients with symptomatic peripheral artery disease. Eur J Vasc Endovasc Surg. 2017;53(2):223-8. https://doi.org/10.1016/j.ejvs.2016.11.021

14. Golleyde J, Leicht AS, Yip L, Rowbotham SE, Pinchbeck J, Jenkins JS, et al. Relationship between disease specific quality of life measures, physical performance, and activity in people with intermittent claudication caused by peripheral artery disease. Eur J Vasc Endovasc Surg. 2020;59(6):957-64. https://doi.org/10.1016/j.ejvs.2020.02.006

15. Januszewski R, Mika P, Konik A, Petricczek T, Nowobilski R, Nizankowski R. Effect of treadmill training on endothelial function and walking abilities in patients with peripheral arterial disease. J Cardiol. 2014;64(2):145-51. https://doi.org/10.1016/j.jcc.2013.12.002

16. World Health Organization. Global recommendations on physical activity for health. Geneva: World Health Organization; 2010. [cited on Aug. 21, 2020]. Available from: https://www.who.int/publications/i/item/9789241599979

17. Hupin D, Raffin J, Barth M, Berger M, Garet M, Stampone K, et al. Even a previous light-active physical activity at work still reduces late myocardial infarction and stroke in retired adults aged>65 years by 32%; the PROOF Cohort Study. Front Public Health. 2019;7:51. https://doi.org/10.3389/fpubh.2019.00051

18. Ku PW, Fox KR, Liao Y, Sun WJ, Chen LJ. Prospective associations of objectively assessed physical activity at different intensities with subjective well-being in older adults. Qual Life Res. 2016;25(11):2909-19. https://doi.org/10.1007/s11136-016-1309-3

19. Fakhry F, Spork S, Ridder M, den Hoed PT, Hunink MG. Long-term effects of structured home-based exercise program on functional capacity and quality of life in patients with intermittent claudication. Arch Phys Med Rehabil. 2011;92(7):1066-73. https://doi.org/10.1016/j.apmr.2011.02.007

20. Li Y, Li Z, Chang G, Wang M, Wu R, Wang S, et al. Effect of structured home-based exercise on walking ability in patients with peripheral arterial disease: a meta-analysis. Ann Vasc Surg. 2015;29(3):597-606. https://doi.org/10.1016/j.avsg.2014.10.010