conScientiae Saúde eISSN: 1983-9324

https://doi.org/10.5585/conssaude.v21n1.23400

Recebido em: 05 dez. 2022 - Aprovado em: 11 abr. 2023
Editora Chefe: Daniela Aparecida Biasotto-Gonzalez
Editor Científico: Cid André Fidelis de Paula Gomes

ASSOCIATION BETWEEN MENTAL HEALTH AND SLEEP QUALITY IN PERIPHERAL ARTERY DISEASE PATIENTS: A LONGITUDINAL STUDY

ASSOCIAÇÃO ENTRE SAÚDE MENTAL E QUALIDADE DO SONO EM PACIENTES COM DOENÇA ARTERIAL PERIFÉRICA: ESTUDO LONGITUDINAL

Allana Andrade Souza[1]
Carolina Benedetti Castellari[2]
Gustavo Oliveira da Silva[2]
Aluísio Andrade-Lima[3]
Juliana Ferreira de Carvalho[4]
Hélcio Kanegusuku[4]
Aline Mendes Gerage[1]
Marilia de Almeida Correia[2]

Approval by the ethics committee: CAAE 31529220.8.0000.5511

Corresponding Author:
Marilia de Almeida Correia, PhD
Universidade Nove de Julho,
Rua Vergueiro 235, São Paulo – SP – Brazil.
ZIP-code: 01504-000
marilia.correia@live.com

Scientific address:
Universidade Nove de Julho, Rua Vergueiro 235, São Paulo – SP – Brazil.
ZIP-code: 01504-000

[1]Universidade Federal de Santa Catarina, Florianópolis, Santa Catarina, Brazil.
[2]Universidade Nove de Julho, São Paulo, Brazil.
[3]Universidade Federal de Sergipe, São Cristóvão, Sergipe, Brazil.
[4]Hospital Israelita Albert Einstein, São Paulo, Brazil;

Abstract
Objective: To analyze the longitudinal association between mental health and sleep quality in peripheral artery disease (PAD) patients in two periods of the COVID-19 pandemic.
Methods: In this longitudinal study, 99 PAD patients were evaluated in two years of COVID-19 pandemic (2020 and 2021). Patients were interviewed by telephone call, and information regarding mental health (anxiety, unhappiness, stress and depression) and sleep quality (sleep change, difficulty to sleep and sleep improvement) were obtained. Patients were divided into: no symptoms (patients that reported no mental health symptoms, n=31, 68.2±9.4 y.o.) and one or more symptoms (patients with at least one mental health symptom, n=68, 68.1±9.4 y.o.).
Results: In 2020, mental health symptoms were associated with sleep change (OR=5.018; p=0.020), difficulty to sleep (OR=12.250; p=0.003) and sleep improvement (OR=0.104; p=0.003). In 2021, mental health was associated only with sleep change (OR=3.522; p=0.035).
Conclusion: The impact of mental health symptoms on sleep quality of PAD patients was attenuated along the coronavirus pandemic.

Keywords: Peripheral Arterial Disease. Mental health. Sleep quality. Social isolation. COVID-19 pandemic.

Resumo
Objetivo: Analisar a associação longitudinal entre saúde mental e qualidade do sono em pacientes com doença arterial periférica (DAP) em dois períodos da pandemia de COVID-19.
Métodos: Neste estudo longitudinal, 99 pacientes com DAP foram avaliados em dois anos de pandemia de COVID-19 (2020 e 2021). Os pacientes foram entrevistados por telefone, obtendo-se informações sobre saúde mental (ansiedade, infelicidade, estresse e depressão) e qualidade do sono (alteração do sono, dificuldade para dormir e melhora do sono). Os pacientes foram divididos em: sem sintomas (pacientes que não relataram sintomas de saúde mental, n=31, 68,2±9,4 anos) e um ou mais sintomas (com pelo menos um sintoma de saúde mental, n=68, 68,1±9,4 anos).
Resultados: Em 2020, os sintomas de saúde mental foram associados à alteração do sono (OR=5,018; p=0,020), dificuldade para dormir (OR=12,250; p=0,003) e melhora do sono (OR=0,104; p=0,003). Em 2021, a saúde mental esteve associada apenas à alteração do sono (OR=3,522; p=0,035).
Conclusão: O impacto dos sintomas de saúde mental na qualidade do sono de pacientes com DAP foi atenuado durante a pandemia de coronavírus.

Descritores: Doença arterial periférica. Saúde mental. Qualidade do sono. Isolamento social. Pandemia COVID-19.

Cite como
Vancouver

Souza, AA, Castellari, CB, Silva, GO, Andrade-Lima, A, Carvalho, JF, Kanegusuku, H, Gerage, AM, Correia, MA. Association between mental health and sleep quality in peripheral artery disease patients: a longitudinal study. *Conscientiae Saúde* 2022;21(1):1-10, e23400. https://doi.org/10.5585/conssaude.v21n1.23400.

Introduction

Peripheral artery disease (PAD) is a chronic condition whose main symptom is intermittent claudication, which is characterized by pain in the lower limbs evoked by walking, that tends to cease with rest, leading to limitations in functional capacity[1]. These symptoms can affect sleep, with studies showing that pain can keep patients awake, and that some of these patients can present sleep apnea, which reduces breathing causing frequent interruptions in sleep[2, 3]. Sleep protects physical and mental health, so it is important to keep a good quality of sleep, and its interruption can increase several health-related risks in general[4].

In these patients, symptoms of anxiety, stress and depression have been associated with the worsening of sleep quality[5]. During the COVID-19 pandemic the restrict social isolation to contain the spread of the virus in the onset of the pandemic generated negative impacts on the mental health of PAD patients[6], including increases in anxiety, unhappiness, stress and depression[5]. Changes in the sleep quality of these patients were also observed, where they reported more difficulty to sleep and sleep interruption[7]. Also, symptoms of stress, anxiety and depression can interfere with sleep quality, and people with these symptoms may have had sleep disturbances that were worsened during the COVID-19 pandemic[5, 7].

However, the COVID-19 pandemic has been composed of distinct moments. In the year of 2020, there were no available vaccines and the social isolation measures were the main strategy to limit the infection, especially for the elderly and subjects with chronic diseases. In 2021, vaccination of vulnerable groups started in January, and restriction of mobility measures was attenuated[8], which might have impacted mental health and sleep quality differently. Thus, in this study we aimed to analyze the association between the prevalence of mental health symptoms (anxiety, unhappiness, stress, and depression) and sleep quality indicators (sleep change, difficulty to sleep and sleep improvement) in PAD patients in two periods of the COVID-19 pandemic.

2 Methods

2.1 Study design and patients

This prospective study included patients with PAD recruited from the research database of patients who participated in studies of our research group[8-13] where data from the body-mass index, ankle-brachial index, prevalence of claudication, claudication and total walking distance, and comorbid diseases were obtained. This study was approved by the University Ethics

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 survey questions; b) a previous diagnosis of PAD; c) age ≥ 45 years old. Patients were only excluded if: a) presented some disability during a phone call that compromises the answer to the questionnaire (i.e., cognitive, hearing, and speech).

2.2 Data collection

Data was collected through a phone interview in two periods: between May and August 2020 and between May and August 2021. In 2020, when transmission was high, there was a large number of cases, with strict restrictions on social isolation, while in the 2021, when the vaccination campaign had already started, even with a predominance in the number of cases, there was a relative ease of social distancing measures[8].

Interviewers filled a questionnaire previously described[5, 12, 14]. Personal information, overall health, mental health and sleep quality information were used in the present study. Personal information included information about sex ("woman" or "man"), date of birth (DD/MM/YYYY). Data on ankle-brachial index, claudication and total walking distance from the six-minute walk test were retrieved from our database considering the last exam performed by the patient. Overall health information included the self-report presence of diseases, such as hypertension, diabetes, high triglycerides, congestive heart failure and stroke. The mental health section was composed of 4-self-reported items to identify frequent feelings related to the COVID-19 pandemic. The following questions were used: 1 – Due to the COVID-19, are you feeling more anxious?; 2 – Due to the COVID-19, are you feeling overwhelmingly unhappy?; 3 - Due to the COVID-19, are you feeling more stressed?; 4- Due to the COVID-19, are you feeling depressed?. Answers to all questions were "Yes" or "No". The sleep quality section included the following questions: 1 – Was there any change in your sleep?; 2 – Do you feel any difficulty to sleep?; 3 – Did you feel any improvement in your sleep?. Answers to all questions were "Yes" or "No".

In the two periods of the COVID-19 pandemic patients were divided into two groups: no mental health symptoms due to COVID-19 pandemic and one or more mental health symptoms due to COVID-19 pandemic.

2.3 Statistical analyses

All statistical analyses were performed using the software SPSS (version 20). The data are presented as mean and standard deviation for continuous variables and absolute and relative frequencies for categorical variables. The Student's T test and Chi-square test were used to compare groups for continuous and categorical variables, respectively. Crude and adjusted logistic regressions were used to verify the association between mental health and sleep quality adjusting for sex, age, body-mass index and ankle-brachial index. $p < 0.05$ was considered statistically significant.

3 Results

One hundred and forty-nine PAD patients participated in the first year of the COVID-19 pandemic. In the second year of evaluation, 33 patients could not be contacted, five dropped out for personal reasons, six had a health problem that avoided them from participating in the study and five died, being three due to acute myocardial infarction, 1 due to stroke, one due to kidney problem and one due to COVID-19. Thus, 99 patients completed the study.

Characteristics of the patients of both groups "No symptoms" and "One or more symptoms" are shown in Table 1. There were no differences between groups regarding sex, age, body-mass index, ankle-brachial index, claudication and total walking distance, and comorbid diseases.

Table 1 - General health characteristics of peripheral artery disease patients according to the number of mental health symptoms during COVID 19 pandemic, (n=99)

Variables	No Symptoms (n=31)	One or more Symptoms (n=68)	*p*
Sex, % Men	34	66	0.542
Age (years)	69 ± 9	68 ± 10	0.514
Body mass index, (kg/m^2)	27.6 ± 5.2	27.9 ± 4.2	0.736
ABI	0.58 ± 0.27	0.63 ± 0.32	0.518
Symptoms of claudication, %	37	63	0.250
Claudication distance (m)	179 ± 122	162 ± 115	0.601
Total walking distance (m)	354 ± 80	344 ± 112	0.702
Comorbid conditions, %			
Dyslipidemia	31	69	0.872
Stroke	22	78	0.421
Diabetes	29	71	0.655
Heart failure	40	60	0.501
Hypertension	31	69	0.944

ABI – Ankle-brachial index. Data are presented in mean ± standard deviation.
Source: the authors.

Table 2 shows the prevalence of each individual mental health symptom among PAD patients. The prevalence of symptoms of sadness, stress and depression increased, while anxiety decreased from the first to the second year ($p < 0.05$ for all). The prevalence of sleep change increased and difficulty to sleep decreased from 2020 to 2021 ($p < 0.05$ for all).

Table 2 - Prevalence of mental health symptoms and of sleep quality indicators of peripheral arterial disease patients on the first (May to August 2020) and second (May to August 2021) year

Variables	2020 (n=99)	2021 (n=99)	*p*
Mental health, %			
Anxiety	54	51	0.005
Unhappiness	33	37	0.016
Stress	29	41	<0.001
Depression	18	28	<0.001
Sleep quality, %			
Sleep change	28	37	0.005
Difficulty to sleep	34	31	<0.001
Sleep improvement	16	29	0.070

Source: The authors.

Logistic regression analysis results are presented in Table 3. In 2020, there was a significant association between the presence of mental health symptoms and sleep quality indicators for both the crude and adjusted regression ($p > 0.05$ for all). In 2021, the presence of mental health symptoms was only associated with sleep change ($p = 0.035$).

Table 3 - Crude and adjusted logistic regression on the association between the prevalence of mental health symptoms and sleep quality indicators Exp(B) [95% CI], *odds ratio* [95% confidence interval]. [a]Adjusted by sex, age, body mass index and ankle-brachial index

	2020				2021			
	Crude		Adjusted[a]		Crude		Adjusted[a]	
	Exp(B) [95% CI]	p	Exp(B) [95% CI]	p	Exp(B) [95% CI]	P	Exp(B) [95% CI]	p
Sleep change	5.426 [1.496; 19.687]	0.010	5.018 [1.283; 19.627]	0.020	2.527 [0.957; 6.672]	0.061	3.522 [1.096; 11.315]	0.035
Difficulty to sleep	7.820 [2.168; 28.202]	0.002	12.250 [2.331; 64.368]	0.003	2.273 [0.819; 6.305]	0.115	3.191 [0.920; 11.076]	0.068
Sleep improvement	0.099 [0.029; 0.343]	0.001	0.104 [0.024; 0.453]	0.003	0.760 [0.301; 1.916]	0.561	0.820 [0.285; 2.360]	0.712

Source: The authors.

4 Discussion

The results revealed that: (i) from the first (2020) to second year (2021) of the COVID-19 pandemic there were significant increases in the prevalence of most of mental health symptoms and sleep quality indicators; (ii) at the first year of the COVID-19 pandemic (2020) mental health symptoms were associated with all sleep quality indicators; (iii) in the second year of the COVID-19 (2021) pandemic mental health indicators were weakly associated with sleep quality indicators.

People with mental health symptoms are more likely to experience changes in sleep, because mental health and sleep are directly associated[15]. Previous studies[16] have shown that during the COVID-19 pandemic, an increase in mental health problems was observed, and PAD patients reported feeling depressed and having more difficulty to sleep compared to pre-pandemic data[7], which corroborates with the findings of our study. These results were probably caused by the consequences of all the lifestyle changes caused by social isolation and by news related to the virus[8]. The substantial increase in sedentary behavior in this population, who already have a high cardiovascular risk, may also have had repercussions on the increase in the prevalence of mental health symptoms that consequently interfere with sleep quality[17, 18].

Stressful circumstances that still persisted in the second year, such as a long period of isolation and the emergence of new challenges such as virus variants, causing an increase in the number of cases and deaths, may have influenced the increase in the prevalence of most mental health symptoms and changes in sleep quality[8]. Previous studies[18, 19] carried out before the COVID-19 pandemic demonstrated that patients with PAD already had impaired mental health and sleep quality compared to individuals without PAD, which could have maximized the impact of the COVID-19 pandemic and thus explain the results of the present study. In addition, with social isolation measures, factors such as distancing from family and friends may have impaired the mental health prognosis of these patients over time[5, 17, 20].

In this study we also found that the prevalence of mental health symptoms was associated to sleep quality indicators in PAD patients. In this population the worsening of mental health status and sleep quality are risk factors for cardiovascular mortality, since symptoms such as anxiety, stress, unhappiness and depression can influence the quality of sleep in patients with PAD[21, 22], which could maximize the longitudinal impact of mental health indicators during the COVID-19 pandemic and thus impair sleep quality, in the end contributing to a worsening of the general health status of these patients. These results may serve as an alert

to health professionals to develop strategies that minimize the clinical impairment caused by the COVID-19 pandemic in PAD and thus prevent long-term consequences in general health.

This study has some limitations: 1) Due to its cross-sectional design, it is not possible to establish a cause and effect relationship, 2) The use of self-reported assessments is susceptible to information bias, 3) The data on the ankle-brachial index, claudication and total distance covered in the six-minute walk test were retrieved from our database considering the latest test performed by the patient before the COVID-19 pandemic, and 4) These results cannot be extrapolated to other populations with other characteristics.

5 Conclusion

In conclusion, the prevalence of mental health symptoms is associated to sleep quality in PAD patients during a period of the COVID-19 pandemic. Thus, strategies that aim to improve mental health should be adopted in order to prevent possible deleterious effects of the COVID-19 pandemic in the sleep quality of PAD patients.

References

1. Criqui MH, Matsushita K, Aboyans V, et al. Lower Extremity Peripheral Artery Disease: Contemporary Epidemiology, Management Gaps, and Future Directions: A Scientific Statement From the American Heart Association. Circulation. 2021. https://doi.org/10.1161/CIR.0000000000001005

2. Ahsan MJ, Latif A, Fazeel HM et al. Obstructive sleep apnea and peripheral vascular disease: a systematic review based on current literature. J Community Hosp Intern Med Perspect. 2020;10: 188–93. https://doi.org/10.1080/20009666.2020.1764276.

3. AlSheikh S. Relationship Between Peripheral Arterial Diseases and Obstructive Sleep Apnea: A Systematic Review. Cureus. 2023;15(2): e35550. https://doi.org/10.7759/cureus.35550

4. Barros MBA, Lima MG, Ceolin MF, Zancanella E, Cardoso TAMO. Quality of sleep, health status and subjective well-being in a population-based study. Rev saúde pública. 2019;53:82. https://doi.org/10.11606/s1518-8787.2019053001067.

5. Ritti-Dias RM, Correia MA, Carvalho JF, Braghieri HA, Wolosker N , Cucato GG, Kanegusuku H. Impact of the COVID-19 pandemic on health lifestyle in patients with peripheral artery disease: A cross-sectional study. J Vasc Nurs 2021;40(1):54-8. https://doi.org/10.1016/j.jvn.2022.01.001.

6. de Donato G, Pasqui E, Alba G, Abu Leil M, Palasciano G. The Limitations of Social Behaviour Imposed by CoVid-19 Impacted the Perception and the Evolution of Peripheral

Arterial Disease Negatively. Ann Vasc Surg. 2021;73:107-13. https://doi.org/10.1016/j.avsg.2021.02.003.

7. Braghieri HA, Correia MA, Carvalho JF, Longano P, et al. Impact of the COVID-19 pandemic on drug treatment of patients with peripheral arterial disease: an observational cross-sectional study. J Vasc Bras. 2021;20:e20210021. https://doi.org/10.1590/1677-5449.210021.

8. Barcellos C, Xavier DR. The different stages, its impacts, and the challenges of the covid-19 pandemic in Brazil. RECIIS (Online). 2022;16:221-6. https://doi.org/10.29397/reciis.v16i2.3349.

9. Farah BQ, Santos MF, Cucato GG, Kanegusuku H, Sampaio LMM, Monteiro FA, et al. Effect of frailty on physical activity levels and walking capacity in patients with peripheral artery disease: A cross-sectional study. J Vasc Nurs. 2021;39:84-8. https://doi.org/10.1016/j.jvn.2021.07.001.

10. Longano P, Kanegusuku H, Correia MA, Puech-Leao P, Wolosker N, Cucato GG, et al. Are cardiovascular function and habitual physical activity levels similar in patients with classic and atypical claudication symptoms? A cross-sectional study. Vascular. 2020;28:360-7. https://doi.org/10.1177/1708538120911292.

11. Kanegusuku H, Cucato GG, Domiciano RM, Longano P, Puech-Leao P, Wolosker N, et al. . Impact of obesity on walking capacity and cardiovascular parameters in patients with peripheral artery disease: A cross-sectional study. . J Vasc Nurs 2020;38:66-71. https://doi.org/10.1016/j.jvn.2020.02.004.

12. Braghieri HA, Kanegusuku H, Corso SD, Cucato GG, Monteiro F, Wolosker N, et al. . Validity and reliability of 2-min step test in patients with symptomatic peripheral artery disease. . J Vasc Nurs. 2021;39:33-8. https://doi.org/10.1016/j.jvn.2021.02.004.

13. de Almeida Correia MA, Andrade-Lima A, Mesquita de Oliveira PL, Domiciano RM, Ribeiro Domingues WJ, Wolosker N et al. Translation and Validation of the Brazilian-Portuguese Short Version of Vascular Quality of Life Questionnaire in Peripheral Artery Disease Patients with Intermittent Claudication Symptoms. Ann Vasc Surg. 2018;51:48-54.e1. https://doi.org/10.1016/j.avsg.2018.02.026.

14. Ritti-Dias RM, Cucato GG, de Oliveira MD, Braghieri HA, de Carvalho JF, Wolosker N et al. Physical activity practice during COVID-19 pandemic in patients with intermittent claudication. Rev Assoc Med Bras (1992). 2021;37(35-39). https://doi.org/10.1590/1806-9282.67.Suppl1.20200793.

15. Clement-Carbonell V, Portilla-Tamarit I, et al. Sleep Quality, Mental and Physical Health: A Differential Relationship. Int J Environ Res Public Health. 2021. https://doi.org/10.3390/ijerph18020460.

16. Vindegaard N, Benros ME. COVID-19 pandemic and mental health consequences: systematic review of the current evidence. Brain Behav Immun. 2020;89:531-42. https://doi.org/10.1016/j.bbi.2020.05.048.

17. Kocevska D, Blanken TF, Van Someren EJW, Rosler L. Sleep quality during the COVID-19 pandemic: not one size fits all. Sleep Med. 2020;76:86-8. https://doi.org/10.1016/j.sleep.2020.09.029.

18. Ragazzo L, Puech-Leao P, Wolosker N, de Luccia N, Saes G, et al. Symptoms of anxiety and depression and their relationship with barriers to physical activity in patients with intermittent claudication. Clinics. 2021;20;76:e1802. https://doi.org/10.6061/clinics/2021/e1802.

19. Fallaci AF, Mendes DJS, Santos JVS, Carvalho AMB, Barreto NMPV, Novais MCM. Level of physical activity, quality of sleep and life in patients with peripheral arterial disease. Rev Ciênc Méd Biol (Impr). 2021;20(1):89-94. https://doi.org/10.9771/cmbio.v20i1.36392

20. Diniz TA, Christofaro DGD, Tebar WR, Cucato GG, Botero JP, Correia MA, et al. Reduction of Physical Activity Levels During the COVID-19 Pandemic Might Negatively Disturb Sleep Pattern. Front Psychol. 2020;20(1):89-94. https://doi.org/10.3389/fpsyg.2020.586157.

21. Thomas M, Patel KK, Gosch K, Labrosciano C, Mena-Hurtado C, Fitridgef R, et al. Mental health concerns in patients with symptomatic peripheral artery disease: Insights from the PORTRAIT registry. J Psychosom Res. 2020;11:131:109963. https://doi.org/10.1016/j.jpsychores.2020.109963.

22. Khan MS, Aouad R. The Effects of Insomnia and Sleep Loss on Cardiovascular Disease Sleep Med Clin 2022;17:193-203. https://doi.org/10.1016/j.jsmc.2017.01.005