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ASSOCIATION BETWEEN PERCEIVED STRESS AND SLEEP QUALITY IN RESISTANT HYPERTENSIVE PATIENTS: CROSS-SECTIONAL STUDY

*Associação do estresse percebido e qualidade do sono de hipertensos resistentes: estudo transversal**Asociación entre el estrés percibido y la calidad del sueño en hipertensos resistentes: estudio transversal***Kalliza Kary Rodrigues da Costa**¹ **Dayse Mary Da Silva Correia**² **Valeriana Catanhede Rodrigues**³ 

RESUMO

OBJETIVO: analisar a associação do estresse percebido e qualidade do sono nos hipertensos resistentes no contexto da pandemia da Covid-19. **Método:** estudo transversal, observacional, descritivo, analítico e de abordagem quantitativa com 40 hipertensos resistentes. Os dados foram coletados por meio de prontuários e questionários validados por telemonitoramento, utilizando formulários on-line no período de janeiro a março de 2022. As análises foram realizadas no programa SPSS (*Statistical for the Social Science*), versão 22.0. **Resultados:** observou-se que 33,1% dos hipertensos têm alto estresse percebido e alteração do sono em 50% da amostra. **Conclusão:** o estudo analisou o perfil típico da amostra, identificando que o alto escore de estresse percebido correlaciona-se com o alto escore de alteração do sono. Isso contribui para uma melhor compreensão e fornece subsídios para estratégias de enfrentamento e políticas de cuidado em situações de crise e pandemias, como a provocada pelo coronavírus.

DESCRITORES: COVID-19; Hipertensão; Telemonitoramento.

^{1,2,3} Universidade Federal Fluminense, Niterói, Rio de Janeiro, Brasil.

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CORRESPONDING AUTHOR: Kalliza Kary Rodrigues da Costa

E-mail: kalizakary@gmail.com

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ABSTRACT

OBJECTIVE: analyze the association between perceived stress and sleep quality in resistant hypertensive patients during the Covid-19 pandemic. **Method:** cross-sectional, observational, descriptive, and analytical study with a quantitative approach involving 40 resistant hypertensive patients. Data were collected through medical records and validated questionnaires via telemonitoring, using online forms from January to March 2022. Analyses were performed using SPSS (Statistical Package for the Social Sciences), version 22.0. **Results:** it was observed that 33.1% of hypertensive patients exhibited high perceived stress, and 50% of the sample presented sleep disturbances. **Conclusion:** the study analyzed the typical profile of the sample, identifying a correlation between high perceived stress scores and high sleep disturbance scores. This contributes to a better understanding of the issue and provides support for developing coping strategies and care policies in crisis situations and pandemics, such as the one caused by the coronavirus.

DESCRIPTORS: COVID-19; Hypertension; Telemonitoring.

RESUMEN

OBJETIVO: analizar la asociación entre el estrés percibido y la calidad del sueño en hipertensos resistentes durante la pandemia de Covid-19. **Método:** estudio transversal, observacional, descriptivo y analítico con enfoque cuantitativo, realizado con 40 hipertensos resistentes. Los datos se recopilaron mediante registros médicos y cuestionarios validados por telemonitoreo, utilizando formularios en línea entre enero y marzo de 2022. Los análisis se realizaron en SPSS (Statistical Package for the Social Sciences), versión 22.0. **Resultados:** el 33,1% de los hipertensos mostró alto estrés percibido y el 50% presentó alteraciones del sueño. **Conclusión:** el estudio identificó que altos niveles de estrés percibido se correlacionan con alteraciones del sueño. Estos hallazgos contribuyen a una mejor comprensión del problema y brindan bases para desarrollar estrategias de afrontamiento y políticas de cuidado en situaciones de crisis y pandemias como la causada por el coronavirus.

DESCRIPTORES: COVID-19; Hipertensión; Telemonitoreo.

INTRODUCTION

Systemic arterial hypertension (SAH) is a prevalent chronic non-communicable disease (NCD), considered the leading cause of death in Brazil and worldwide. It is one of the main modifiable risk factors for cardiovascular disease, chronic kidney disease and premature death, which have a significant impact on health-related costs.¹

While Resistant Arterial Hypertension (RAH) is defined when blood pressure levels remain above the recommended parameters, even with the use of three antihypertensive drugs from different classes, including a renin-angiotensin system blocker (angiotensin-converting enzyme inhibitor [ACEI] or angiotensin receptor blocker [ARB], a long-acting calcium channel blocker (CCB) and a long-acting thiazide diuretic (TD) in maximum recommended and tolerated doses, administered with frequency, appropriate dosage and proven adherence.²

Sleep quality and hypertension are strongly influenced by lifestyle. Hypertensive patients have poorer sleep quality and are more susceptible to disorders such as obstructive sleep apnea syndrome (OSA). Similarly, individuals with sleep disorders such as OSA may suffer from excessive daytime sleepiness, resulting in a high morbidity rate in the population.³

The COVID-19 pandemic has impacted mental health, generating anxiety, depression, acute stress and Post-Traumatic Stress Disorder, with possible lasting damage.⁴ Measures such as social isolation have aggravated these effects, affecting various spheres of society.⁵

The COVID-19 scenario has revealed challenges, especially for at-risk groups, such as the elderly and individuals with comorbidities, including hypertension and diabetes.⁶ Studies highlight the importance of understanding psychosocial impacts in order to develop effective interventions, such as telemonitoring and health education.⁷

It is worth noting that situational diagnosis can guide strategies to promote health, improve sleep and physical and mental health, as well as qualifying outpatient nursing care. The scarcity of data on stress and sleep quality in patients with cardiovascular diseases highlights the need for research to support public policies and response strategies to epidemics and pandemics.

Although there is evidence of an association between perceived stress and sleep quality in various populations, the lack of studies on this relationship in hypertensive patients during the COVID-19 pandemic creates an important gap. Understanding how factors specific to the pandemic influence

this relationship is crucial for the cardiovascular health of a vulnerable population.

Therefore, the aim of this investigation was to analyze the association between perceived stress and sleep quality in resistant hypertensive patients in the context of the COVID-19 pandemic.

METHOD

Ethical aspects

The study followed national and international ethical guidelines and was approved by the Research Ethics Committee of the Faculty of Medicine of the Fluminense Federal University (CEP/FM-UFF, under opinion no. 5.207.329. Participation was voluntary, with the Free and Informed Consent Form (FICF) being obtained online via messaging app. All participants confirmed that they understood the procedures and gave their affirmative consent before the collection began, which was conducted within the required ethical standards.

Study design, period and location

This is a descriptive, analytical, cross-sectional, observational study with a quantitative approach, which sought to investigate the association between perceived stress and sleep quality in resistant hypertensive patients during the COVID-19 pandemic. The study, guided by The Strengthening the Reporting of Observational studies in Epidemiology (STROBE)⁸ tool, is part of the “PISAV_HAS in the context of the COVID-19 pandemic - Phase 1” project. Data collection took place from January to March 2022, through clinical records and validated questionnaires applied via telemonitoring in patients treated at the outpatient clinic of the Antônio Pedro University Hospital (HUAP/UFF), in the municipality of Niterói, Rio de Janeiro.

Sample

This was a population of 140 outpatients, of whom 42 hypertensive patients were selected as a non-probabilistic sample. Two participants were excluded due to lack of contact, totaling 40 participants in the final analysis.

Inclusion and exclusion criteria

Individuals over the age of 18 with a diagnosis of resistant hypertension were included. Those who were hospitalized, had cognitive or hearing impairments that made telemonitoring difficult, and those who could not be contacted were excluded.

Study protocol

Due to the social isolation caused by COVID-19, telemonitoring was carried out via telephone with participants registered at the outpatient clinic, from Monday to Friday, between 10am and 5pm, ensuring privacy. The calls lasted around 20 minutes, and the data was recorded on Google Forms[®] with name coding. After explaining the research, the informed consent form was sent by instant message, and data collection began after registered acceptance.

During the telemonitoring, two validated instruments were used: the Perceived Stress Scale-10 (EPS-10) and the Mini-Sleep Questionnaire (MSQ), both validated in Brazil. From January to February 2022, medical records were consulted in order to collect sociodemographic and clinical data, using a single questionnaire.

The Perceived Stress Scale-10 (EPS-10) consists of 10 items. Each item has a response range of zero (0) to (4), (0=never; 1=almost never; 2=sometimes; 3=almost always; 4=always).⁵ The questions with a positive connotation (4, 5, 6, 7, 9, 10) have their scores inverted, as follows: 0= 4, 1= 3, 2= 2, 3= 1 and 4= 0.5 The other questions are negative (1, 2, 3, 8). The scale total is the sum of the scores for these 10 questions. Scores can vary from zero (0) to (40), with higher numbers indicating a greater perception of stress.¹¹

The Mini-Sleep Questionnaire - MSQ is a brief measurement tool for assessing sleep disorders through subjective evaluation using a questionnaire. Made up of ten questions, it assesses the frequency of sleep-related complaints.¹⁰ The score ranges from 10 to 70 points, with 10-24 indicating good sleep; 25-27 slightly altered sleep; 28-30 moderately altered sleep and a score above 30 indicating very altered sleep. It is graded out of 7 points (1 = never, 7 = always).¹¹ Due to its brevity, the Mini Sleep Questionnaire is highly applicable in the context of telemonitoring.¹¹

Analysis of results

The data was organized in spreadsheets and later analyzed using the Statistical Program for Social Science (SPSS) version 22.0 and the Microsoft Excel 2007 application. The descriptive analysis used frequency distributions and descriptive statistics (mean, median, standard deviation, coefficient of variation - CV) to characterize the variables. Variability was classified as low ($CV < 0.20$), moderate ($0.20 \leq CV < 0.40$) or high ($CV \geq 0.40$).

Comparisons between quantitative or ordinal variables from two independent groups were made using the Mann-Whitney test, while correlations were assessed using Spearman's coefficient (ρ). Correlations were considered strong if $|\rho| > 0.7$. The significance level adopted was 5% ($p < 0.05$), and the null hypothesis was

rejected when the p-value was below this threshold. Prevalence and frequency estimates were also used in the analysis.

RESULTS

Of the 140 hypertensive patients seen at the specialized outpatient clinic, 42 were initially included in the study for

convenience and voluntary acceptance, but two were excluded due to lack of contact, making a total of 40 participants. Table 1 shows the frequencies of the variables that characterize the patients, highlighting the highest frequencies and those that differ by up to 5%, allowing us to identify the typical (modal) profile of the sample.

Table 1 - Frequency distribution of variables characterizing patients. Niterói, RJ, Brazil, 2022

Variable	Categoria	F	%
Age (years)	30 – 40	2	4,8
	40 – 50	2	4,8
	50 – 60	13	31,0
	60 – 70	16	38,1
	70 – 80	8	19,0
	80 – 90	1	2,4
Gender	Female	37	88,1
	Male	5	11,9
Skin color	Not declared	7	16,7
	White	9	21,4
	Black	9	21,4
	Brown	17	40,5
Marital status	With a steady partner - Married or in a stable union	20	47,6
	Without a steady partner - Single, Divorced or Separated Separated	12	28,6
	Widowed	10	23,8
Level of Education	Incomplete primary education	11	26,2
	Complete elementary school	11	26,2
	Secondary school incomplete	2	4,8
	High School Completed	15	35,7
	Higher Education Incomplete	1	2,4
	Higher Education Complete	2	4,8

Variable	Categoria	F	%
Main Comorbidities	Diabetes Mellitus	20	47,6
	Dyslipidemia	13	31,0
	Chronic Kidney Disease	9	21,4
	Smoking	9	21,4
	Anxiety	5	11,9
	SAH	4	9,5
	Depression	3	7,1
	Glaucoma	3	7,1
	Alcoholism	3	7,1
	CVI*	3	7,1
Time since SAH diagnosis	Less than 6 years	4	9,5
	6 to 10 years	8	19,0
	11 to 15 years	6	14,3
	16 to 20 years	6	14,3
	Over 20 years old	18	42,9

Source: Author, 2022.

Table 1 shows the frequency of the answers that make up the Perceived Stress score and their classification. The final score (0 to 40) takes into account the inversion of the scores for positive questions (4, 5, 7 and 8). The stress rating ranges from “none” (0) to “maximum perceived” (40).

As for the classification based on the highest frequency, the patients in this study typically have “high perceived stress”, as shown in Table 1.

Chart I - Frequency distribution of the perceived stress scale. Niterói, RJ, Brazil, 2022

Question	Answer	Overall (n=42)	
		F	%
How often have you been upset because of something that happened unexpectedly? (consider the last 30 days)	Never	7	16,7
	Almost never	8	19,0
	Sometimes	11	26,2
	Infrequently	3	7,1
	Very often	13	31,0

Question	Answer	Overall (n=42)	
		F	%
How often have you felt that you were unable to control important things in your life? (consider the last 30 days)	Never	13	31,0
	Almost never	6	14,3
	Sometimes	8	19,0
	Infrequently	5	11,9
	Very often	10	23,8
How often have you been nervous or stressed? (consider the last 30 days)	Never	2	4,8
	Almost never	7	16,7
	Sometimes	7	16,7
	Infrequently	4	9,5
	Very often	22	52,4
How often have you been confident in your ability to deal with your personal problems? (consider the last 30 days)	Never	2	4,8
	Almost never	4	9,5
	Sometimes	6	14,3
	Infrequently	7	16,7
	Very often	23	54,8
How often have you felt that things have turned out the way you expected? (consider the last 30 days)	Never	4	9,5
	Almost never	9	21,4
	Sometimes	13	31,0
	Infrequently	6	14,3
	Very often	10	23,8
How often did you feel you couldn't cope with all the things you had to do? (consider the last 30 days)	Never	10	23,8
	Almost never	8	19,0
	Sometimes	10	23,8
	Infrequently	6	14,3
	Very often	8	19,0
How often have you been able to control irritations in your life? (consider the last 30 days)	Never	1	2,4
	Almost never	7	16,7
	Sometimes	11	26,2
	Infrequently	5	11,9
	Very often	18	42,9

Question	Answer	Overall (n=42)	
		F	%
How often did you feel that all aspects of your life were under control? (consider the last 30 days)	Never	4	9,5
	Almost never	9	21,4
	Sometimes	6	14,3
	Infrequently	6	14,3
	Very often	17	40,5
How often have you been angry about things that were out of your control? (consider the last 30 days)	Never	5	11,9
	Almost never	15	35,7
	Sometimes	4	9,5
	Infrequently	7	16,7
	Very often	11	26,2
How often have you felt that problems have piled up so much that you couldn't solve them? (consider the last 30 days)	Never	15	35,7
	Almost never	5	11,9
	Sometimes	9	21,4
	Infrequently	4	9,5
	Very often	9	21,4
Rating of Perceived Stress	Very low (score from 1 to 9)	10	23,8
	Low (score from 10 to 19)	11	26,2
	High (score from 20 to 29)	15	35,7
	Very high (score from 30 to 39)	6	14,3

Source: Author, 2022.

Table 2 shows the frequency distribution of the questions that determine the Sleep Disturbance score and the distribution of the classification of the Sleep Disturbance score.

Chart 2 - Frequency distribution of the mini sleep questionnaire. Niterói, RJ, Brazil, 2022

Question	Answer	Overall (n=40)	
		F	%
Do you have trouble falling asleep at night?	Never	14	35,0
	Very rarely	4	10,0
	Sometimes	5	12,5
	Often	2	5,0
	Very often	10	25,0
	Always	5	12,5
Do you wake up at dawn and can't get back to sleep?	Never	13	32,5
	Very rarely	5	12,5
	Rarely	4	10,0
	Sometimes	8	20,0
	Often	1	2,5
	Very often	6	15,0
Do you take sleeping pills or tranquilizers?	Never	22	55,0
	Very rarely	2	5,0
	Rarely	3	7,5
	Sometimes	1	2,5
	Often	3	7,5
	Very often	5	12,5
Do you sleep during the day?	Never	18	45,0
	Very rarely	6	15,0
	Rarely	4	10,0
	Sometimes	7	17,5
	Often	3	7,5
	Very often	1	2,5
	Always	1	2,5

Question	Answer	Overall (n=40)	
		F	%
Do you still feel tired when you wake up in the morning?	Never	15	37,5
	Very rarely	5	12,5
	Rarely	2	5,0
	Sometimes	4	10,0
	Often	4	10,0
	Very often	7	17,5
	Always	3	7,5
Do you snore at night (that you know of)?	Never	10	25,0
	Very rarely	3	7,5
	Rarely	6	15,0
	Sometimes	5	12,5
	Often	13	32,5
	Very often	3	7,5
Do you wake up during the night?	Never	5	12,5
	Very rarely	3	7,5
	Rarely	1	2,5
	Sometimes	11	27,5
	Often	6	15,0
	Very often	7	17,5
	Always	7	17,5
Do you wake up with a headache?	Never	21	52,5
	Very rarely	4	10,0
	Rarely	3	7,5
	Sometimes	8	20,0
	Often	1	2,5
	Very often	2	5,0
	Always	1	2,5

Question	Answer	Overall (n=40)	
		F	%
Do you feel tired for no reason?	Never	11	27,5
	Very rarely	7	17,5
	Rarely	2	5,0
	Sometimes	7	17,5
	Often	2	5,0
	Very often	7	17,5
	Always	4	10,0
Are you a restless sleeper (constant changes of position and/or movement)?	Never	19	47,5
	Very rarely	2	5,0
	Rarely	1	2,5
	Sometimes	2	5,0
	Often	5	12,5
	Very often	6	15,0
	Always	5	12,5
Sleep classification	Good sleep (10- 24)	11	27,5
	Slightly altered sleep (25-27)	6	15,0
	Moderately disturbed sleep (28-30)	3	7,5
	Very disturbed sleep (30-70)	20	50,0

Source: Authorr, 2022.

Table 2 shows the main statistics for the distribution of stress perception scores and sleep disturbance scores. The behavior of the score distributions can be seen in Table 2.

Table 2 - Main statistics of the score distributions. Niterói, RJ, Brazil, 2022

Statistics	Minichal	Pain	Perceived Stress	Sleep
Minimum	0,0	0,0	1,0	14,0
25th percentile	8,0	0,0	11,0	24,0
50th percentile	14,0	7,0	19,0	30,5
75th percentile	23,0	19,0	25,0	43,5
Maximum	41,0	39,0	33,0	55,0
Average	15,9	11,1	18,0	33,1
Standard Deviation	10,7	11,8	9,0	11,4
Coefficient of Variation	0,67	1,06	0,50	0,34

Minichal: Mini-questionnaire for quality of life in hypertension

At the end of the questionnaire, patients were asked how many hours they slept during the night and how they rated the quality of their sleep. The frequency distribution of the answers to these questions can be seen in Table 3.

Chart 3 - Frequency distribution of the last 2 questions. Niterói, RJ, Brazil, 2022

Question	Answer	Overall (n=40)	
		F	%
How many hours of sleep do you normally get at night?	Up to 4 hours	8	20,0
	4 to 7 hours	22	52,5
	8 to 10 hours	10	25,0
How would you rate your quality of sleep?	Poor	10	25,0
	Bad	4	10,0
	Good	17	40,5
	Excellent	9	21,4

Source: Author, 2022.

DISCUSSION

The prevalence of hypertension is higher in women aged 65 and over (68.0%) than in men in the same age group (61.5%).¹ Age is also moderately related to the number of comorbidities, with a significant positive correlation of 0.51, indicating that older patients tend to have more comorbidities.¹ Ageing results in changes to the blood vessels, making hypertension more common, which affects the quality of life, physical capacity, social relationships and autonomy of these individuals.¹²

Data published in the Surveillance System for Risk and Protective Factors for Chronic Diseases by Telephone Survey (VIGITEL) indicate an association between black skin color and self-reported hypertension. However, in our study, 40% of the sample reported brown skin color, which differs from this association.¹³

Gender is associated with the risk of mood disorders, with a higher prevalence in women. Studies indicate that women who are single and have more schooling are more likely to use health services for mental health reasons.¹² However, in our study, the predominant sample of women is married or lives with partners and has a low level of schooling, which explains the results found.

The study indicated “high perceived stress”, especially among women, who are more affected by mood disorders and stress. In addition, they tend to seek mental health services more often, especially if they are single and have more schooling.¹⁴

In Brazil, hypertension is more prevalent among individuals with less schooling¹, which can affect adherence to treatment and perception of the disease. Another study revealed that younger people with more schooling were more prone to stress and psychosocial disorders¹⁵, possibly due to exposure to information on the internet or a lack of personal resources to deal with crises.¹⁶

A recent meta-analysis¹⁷ with 46,248 patients highlighted that hypertension and cardiovascular diseases are significant risk factors for critical outcomes during the pandemic, increasing the propensity for sleep disorders, stress, anxiety and compromised quality of life.

Diabetes Mellitus stood out among the comorbidities. This can contribute to deterioration in cognitive function and mental health. Little attention has been paid to global trends in diabetes complications and how the characteristics of diabetes-related morbidity have changed.¹⁸

The global burden of diabetes has increased significantly over the last two decades and is expected to affect more than 642 million adults by 2040, mainly with cases of type 2 diabetes.¹⁹

A recent study of 240 individuals found that smoking, use of antihypertensive and hypoglycemic medication, concern about salt intake and a family history of hypertension are associated with greater perceived stress in the endurance and exhaustion phases.²⁰

The Sleep Distress score is moderately correlated with the Perceived Stress score. The correlation is positive, 0.60, and significant (p -value=0.000), indicating that patients with a high stress score tend to have a high Sleep Distress score and vice versa. Therefore, a high stress score is moderately correlated with a high sleep disturbance score, and vice versa, which means that stress has a significant impact on increasing the patient's sleep disturbance score with a moderate correlation.

There was a significant frequency of patients who reported having very poor or poor sleep quality (35.0%). In the analysis of the sleep disturbance score, a higher percentage of patients had very disturbed sleep, corroborating recent publications which have shown that the fear of being infected by the virus can affect the psychological well-being, emotional and physical health of many people, leading to changes in sleep quality and high levels of stress, compromising their immune response.⁴⁻²¹

CONCLUSION

The study analyzed the profile of hypertensive patients, associating perceived stress and sleep disorders with sociodemographic variables such as age, gender, schooling and the presence of comorbidities, highlighting the vulnerability of this group. The correlation between high stress scores and sleep disorders reinforces the need for specific interventions, especially in crisis contexts such as the pandemic.

Despite the limitations, such as the small sample size and the focus on a single location, the results provide support for public policies and nursing practices that promote mental health and well-being, helping to control hypertension. The study highlights the role of nurses in the integrated management of patients' physical, mental and social health.

The expansion of digital medicine and new technologies are emerging as fundamental tools to improve the early detection and treatment of sleep disorders and stress, enhancing the quality of life of hypertensive patients and promoting advances in public health.

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