The Effect of Fibromyalgia on Sleep Quality in Women with Obesity

O Efeito da Fibromialgia na Qualidade do Sono de Mulheres Com Obesidade

El Efecto de la Fibromialgia en la Calidad del Sueño de Mujeres con Obesidad

RESUMO

OBJETIVO: Avaliar a influência da fibromialgia na qualidade do sono de mulheres com obesidade. **MÉTODO:** Foi conduzido um estudo transversal com mulheres diagnosticadas com fibromialgia e obesidade. Realizaram-se análises descritivas, de correlação e regressão linear utilizando dados antropométricos e pontuações do Índice de Qualidade de Sono de Pittsburgh, Questionário de Impacto da Fibromialgia Reduzido e Escala Visual Analógica. **RESULTADO:** Os resultados revelaram uma associação positiva entre as pontuações do Índice de Qualidade de Sono de Pittsburgh e os valores obtidos no Questionário de Impacto da Fibromialgia Reduzido, na Escala Visual Analógica de dor e no Índice de Massa Corporal. O modelo de regressão indicou que tanto o impacto da fibromialgia quanto o excesso de peso afetam negativamente a qualidade do sono de forma independente. **CONCLUSÃO:** Tratamentos direcionados à melhoria da qualidade do sono em mulheres com FM devem incluir estratégias voltadas à redução dos impactos da obesidade.

DESCRITORES: Obesidade; Qualidade de Vida; Apneia Obstrutiva do Sono; Sono.

ABSTRACT

OBJECTIVE: To evaluate the influence of fibromyalgia on the sleep quality of women with obesity. **METHOD:** A cross-sectional study was conducted with women diagnosed with both fibromyalgia and obesity. Descriptive analysis, correlation analysis, and linear regression were performed using anthropometric data and scores from the Pittsburgh Sleep Quality Index, the Fibromyalgia Impact Questionnaire - Revised, and the Visual Analog Scale. **RESULTS:** The results revealed a positive association between the Pittsburgh Sleep Quality Index scores and the values obtained from the Fibromyalgia Impact Questionnaire - Revised, the Visual Analog Scale for pain, and the Body Mass Index. The regression model indicated that both the impact of fibromyalgia and excess weight independently affect sleep quality in a negative way. **CONCLUSION:** Treatments aimed at improving sleep quality in women with fibromyalgia should include strategies focused on reducing the impact of obesity.

KEYWORDS: Obesity; Quality of Life; Obstructive Sleep Apnea; Sleep.

RESUMEN

OBJETIVO: Evaluar la influencia de la fibromialgia en la calidad del sueño de mujeres con obesidad. **MÉTODO:** Se llevó a cabo un estudio transversal con mujeres diagnosticadas con fibromialgia y obesidad. Se realizaron análisis descriptivos, de correlación y regresión lineal utilizando datos antropométricos y puntuaciones del Índice de Calidad de Sueño de Pittsburgh, el Cuestionario de Impacto de la Fibromialgia - Revisado, y la Escala Visual Analógica. **RESULTADOS:** Los resultados revelaron una asociación positiva entre las puntuaciones del Índice de Calidad de Sueño de Pittsburgh y los valores obtenidos en el Cuestionario de Impacto de la Fibromialgia - Revisado, la Escala Visual Analógica del dolor y el Índice de Masa Corporal. El modelo de regresión indicó que tanto el impacto de la fibromialgia como el exceso de peso afectan negativamente la calidad del sueño de forma independiente. **CONCLUSIÓN:** Los tratamientos dirigidos a mejorar la calidad del sueño en mujeres con fibromialgia deben incluir estrategias enfocadas en reducir los impactos de la obesidad.

DESCRIPTORES: Obesidad; Calidad de Vida; Apnea Obstructiva del Sueño; Sueño.

RECEIVED: 01/26/2025 **APPROVED:** 02/10/2025

How to cite this article: Silva WCC, Figueiredo RC, Guinsburg PV, Costa LP. The Effect of Fibromyalgia on Sleep Quality in Women with Obesity. Saúde Coletiva (Edição Brasileira) [Internet]. 2025 [acesso ano mês dia];15(93):14793-14898. Disponível em: DOI: 10.36489/saudecoletiva.2025v15i93p14793-14898

William Carvalho Costa da Silva
Nutrition student (UERJ)
ORCID: https://orcid.org/ 0009-0006-2505-1594

Pedro Vaissman Guinsburg
Doctor in Economics (University of Wisconsin)
ORCID: https://orcid.org/ 0000-0002-5722-1766

Renata de Campos Figueiredo
Rheumatologist (UERJ)
ORCID: https://orcid.org/ 0009-0005-2204-0198

Luciane Pires da Costa
Doctorate in Clinical and Experimental
ORCID: https://orcid.org/ 0000-0002-3369-864X

INTRODUCTION

Fibromyalgia (FM) is a chronic condition characterized by widespread musculoskeletal pain, psychological disturbances, memory problems, fatigue, and sleep problems. It is estimated that, in 2017, the global prevalence of FM ranged from 0.2% to 6.6%. [1] Sleep disorders with high prevalence in people diagnosed with FM include difficulty falling asleep and staying asleep, waking up too early, and non-restorative sleep.[2]

Articles that studied fibromyalgia symptoms and sleep indicate a bidirectional interaction between these factors. Thus, poor sleep quality has been associated with pain [3] which in turn negatively influences the quality of sleep. On the other hand, patients who experience a restorative night's sleep report an improvement in their symptoms. [4]

Disruption of slow-wave sleep has been shown to modulate the inhibitory response of the central nervous system (CNS) to painful stimuli, in addition to increasing sensitivity to non-painful stimuli. [5] This finding suggests one of several possible interactions between sleep and FM, given that hyperalgesia is a symptom frequently reported by these patients. In addition, another factor that reinforces this association are studies that performed polysomnography in women with FM, demonstrating a reduction in slow-wave sleep, as well as changes in the physiology of rapid eye movement (REM) sleep and non-REM sleep. [6]

Evidence of the interaction between FM and sleep is the relationship between neuroendocrine and pain mechanisms. Changes in the hypothalamic-pituitary-adrenal axis have been identified in patients with fibromyalgia, which in turn modulates the circadian cycle, promoting metabolic changes that interfere with normal sleep-wake cycles. [2] Decreased plasma concentrations of growth hormone (GH) have been detected in patients with fibromyalgia, as this hormone is produced mainly during sleep and its secretion is affected by sleep interruptions in advanced stages. Fibromyalgia and GH deficiency in adults have some characteristics in common, such as asthenia, muscle weakness, reduced fat-free mass, depressive mood, cold intolerance and impaired memory. [7] In a subpopulation of patients with fibromyalgia, reduced levels of insulin-like growth factor (IGF-1) were also found. [8]

In a study that analyzed the cerebrospinal fluid of women with FMS, increased levels of substance P were detected, which plays a central role in pain signaling. [9] Furthermore, when investigating the effect of administering substance P to mice, a decrease in the ability to fall asleep and an increase in awakenings were observed. It was also found that this effect was reversed by an antagonist of the neurokinin-1 (NK-1) receptor [10], which raises the hypothesis that a decrease in substance P levels could reduce the negative effects of this substance on sleep.

Fibromyalgia continues to be a disease that mainly affects women, with obesity being one of the factors that can negatively affect sleep quality. [11] Metabolic changes caused by obesity can lead to sleep disorders such as obstructive apnea. [12]

As a consequence of non-restorative sleep, studies point to hormonal changes, such as increased cortisol levels, which can lead to greater difficulty sleeping and increased cravings for unhealthy foods. Appetite-regulating hormones are also affected by sleep hyperfragmentation, favoring increased ghrelin levels and decreased leptin levels, causing a vicious cycle that favors weight gain. [13]

Given the multiple mechanisms involved in the pathophysiology of fibromyalgia, as well as the different aspects possibly related to the exacerbation of symptoms due to adiposity, this article aimed to verify the influence of fibromyalgia on the sleep quality of women with obesity.

METHOD

Study Population

We conducted a cross-sectional study with adult women diagnosed with fibromyalgia and obesity (BMI > 30 kg/m²), recruited by convenience from January 2022 to November 2024, having the Certificate of Presentation for Ethical Appreciation (CAAE) issued by Plataforma Brasil no. 80174523.0.0000.5259. The participants were regulated by the Unified Health System for care at the Interdisciplinary Support Center for People with Obesity and Fibromyalgia of the Obesity Assistance Laboratory (LAçO), of the State University of Rio de Janeiro.

Body Composition Assessment

The assessment of body compo-

DOI: https://doi.org/10.36489/saudecoletiva.2025v15i93p14793-14898

sition was performed using the bioelectrical impedance method (Inbody 270), in which measurements of weight, Body Mass Index (BMI), percentage of lean mass, skeletal muscle mass, percentage of body fat and body fat mass were collected.

Assessment of the Impact of Fibromyalgia

To assess the impact of Fibromyalgia, we use a specific instrument validated for Brazilian Portuguese, the Reduced Fibromyalgia Impact Questionnaire - FIQR. [14] The FIQR assessment includes subscales, aspects related to functional capacity, professional situation, psychological disorders and physical symptoms. Composed of 7 subscales, its total score ranges from zero to 100, and the higher the score, the greater the impact of fibromyalgia on the quality of life of the person being assessed.

Pain Assessment

We use the Visual Analogue Scale (VAS) to help measure the intensity of the patient's pain. It is an important instrument for checking the patient's progress during treatment and even at each appointment, in a more reliable way. [15] To use the VAS, the attendant must ask the patient about their level of pain, with 0 meaning total absence of pain and 10 the maximum level of pain that the patient can bear.

Sleep Quality Assessment

The Pittsburgh Sleep Quality Index (PSQI) was used to assess subjective sleep quality. This instrument consists of 19 items grouped into seven components, each receiving a score from 0 to 3. Its components are, respectively: (1) subjective sleep quality; (2) sleep latency; (3) sleep duration; (4) habitual sleep efficiency; (5) sleep disturbances; (6) use of sleeping medications; and (7) daytime dysfunction. The scores of the seven components were added to an overall PSQI score, which ranges from 0 to 21. Scores between 0 and 4 indicate good sleep quality, those from 5 to 10 indicate poor quality, and those greater than 10 indicate a sleep disorder.

Statistical

We performed descriptive analysis of the data with mean and standard deviation. To assess data distribution, we used the Shapiro-Wilk test, with significance set at $p \geq 0.05$. Correlations were performed using Spearman's test and causality was determined using linear regression. Significance level was set at $p \leq 0.05$. Software used: Excel and Jamovi.

RESULTS

A total of 33 adult women were evaluated, 2 were not evaluated for the impact of fibromyalgia (FIQ) and 7 did not respond to the Pittsburgh Sleep Quality Index. Regarding the parameters evaluated, the population presented body composition classified as severely obese (BMI≥35 kg/m²), the impact of fibromyalgia on the lives of these women was expressively negative, accompanied by the pain perceived at the time of the interview, which corresponded to severe pain for the majority (Table 1).

Table 1 – Description of anthropometric and clinical characteristics

				Standard Deviation	Shapiro-Wilk	
	N	Omission	Mean	(±)	w	p
Age (years)	33	3	52.67	*10.71*	0.958	0.233
BMI (Kg/m²)	33	3	35.62	*3.86*	0.983	0.878*
FIQ (Total)	31	5	79.09	*13.86*	0.941	0.088*
EVA (Total)	32	4	8.09	*1.49*	0.897	0.005

BMI - Body Mass Index; FIQ - Fibromyalgia Impact Questionnaire (FIQ) ; VAS - Visual Analogue Scale; Shapiro-Wilk - statistical test to assess data distribution; Significance level for p≥0.05

The reduced sleep quality of these women was verified using the Pittsburgh Sleep Quality Index, which considered all subscales that include factors that influence sleep quality but cannot be evaluated separately. The total score verified may be representative of reduced sleep quality (Table 2).

DOI: https://doi.org/10.36489/saudecoletiva.2025v15i93p14793-14898

Table 2 – Characteristics of sleep quality in its different domains according to the Pittsburgh sleep quality index.

				Shapiro-Wilk	
	N	Omission	Mean	w	p
1. Subjective Sleep Quality	29	7	2.07	0.804	<.001
2. Sleep Latency	29	7	2.38	0.654	<.001
3. Sleep Duration	29	7	1.59	0.862	0.001
4. Habitual Sleep Efficiency	29	7	1.69	0.839	<.001
5. Sleep Disorders	29	7	2.00	0.809	<.001
6. Medical use	29	7	1.90	0.651	<.001
7. Daytime Disturbances	29	7	1.83	0.841	<.001
Total Score	29	7	13.45	0.971	0.598*

Shapiro-Wilk - statistical test to assess data distribution; Significance level set at p≥0.05.

To construct the linear regression model, we considered variables (FIQ, BMI, age) that the literature shows can be correlated and that, in isolation, are also described as factors that interfere with sleep quality. In this way, we verified whether fibromyalgia interferes with sleep quality, controlled by BMI, age and vice versa. The proposed regression model was:

$$Sleep\ Quality\ Pittsburg = \beta 0 + \beta 1 \times FIQ + \beta 2 \times BMI + \beta 3 \times Age +$$

The estimates found for the proposed model can be seen in Table 4.

We verified the following associations between the variables of interest in the study: the total score of the sleep quality index showed a positive association with the visual analog scale (VAS), body composition (BMI) and the fibromyalgia impact questionnaire (FIQ) according to the values described in table 3.

Table 3 – Correlation matrix between variables of interest

		FIQ (Total)	Pittsburgh (Total)	IMC (Kg/m²)	VAS (Total)
FIQ (Total)	Spearman's Rho	—			
	gl	—			
	p-value	—			
Pittsburgh (Total)	Spearman's Rho	0.554**	—		
	gl	23	—		
	p-value	0.004	—		
BMI (Kg/m²)	Spearman's Rho	0.198	0.388*	—	
	gl	29	25	—	
	p-value	0.286	0.046	—	
VAS (Total)	Spearman's Rho	0.352	0.423*	0.198	—
	gl	29	24	30	—
	p-value	0.052	0.031	0.278	—

Significance level for * p < .05 (weak), ** p < .01 (moderate), *** p < .001 (strong).
FIQ - Fibromyalgia Impact Questionnaire; Pittsburgh - Pittsburgh Sleep Quality Index; BMI - Body Mass Index; VAS - visual analog scale.

Table 4 – Coefficients of the linear regression model considering the dependent variable the sleep quality index

Predictor	Estimates	Standard-Error	t	p
Intercept	-7.0802	6.1146	-1.16	0.259
FIQ (Total)	0.0815	0.0437	1.87	0.076
BMI(Kg/m²)	0.3769	0.1624	2.32	0.030

Significance level for * p < .05 (weak), ** p < .01 (moderate), *** p < .001 (strong).
FIQ - Fibromyalgia Impact Questionnaire; BMI - Body Mass Index.

We found that in the proposed model, FIQ coefficients were 0.0815 with a p-value of 0.076 and BMI 0.3760 with a p-value of 0.030. Considering a one-sided analysis, the effect of the impact of fibromyalgia (FIQ) is significantly negative at a significance level of 10% and the effect of Obesity (BMI) is significantly negative at a significance level of 5%.

DISCUSSION

The severity of the disease is often assessed using the fibromyalgia impact questionnaire, linked to other clinical parameters such as the subjective perception of pain at the time of assessment. Although there is no cut-off point, the higher the FIQ scores, the more functional impairment and symptoms are experienced. As we can see in Table 1, the group of women assessed can be considered to be in an advanced stage of the disease, with the majority scoring above 80 on the FIQ and 8 on the subjective perception of pain.

DOI: https://doi.org/10.36489/saudecoletiva.2025v15i93p14793-14898

In a study carried out in 2019 in different regions of Europe in order to map the impact of the severity of fibromyalgia on the quality of life of women, it was found that those with the highest scores were also those who had greater physical impairment, fatigue, depression and anxiety, and lower general well-being. [16]

> This clinical context of reduced quality of life, pain syndrome and compromised mental health has been associated with concomitant changes in sleep quality. [17]

In order to identify this possible alteration in the study population, we used the Pittsburgh Sleep Quality Index, whose effectiveness has been validated in several studies, establishing correlations with other sleep measures and health outcomes, such as cardiovascular health, mental health and metabolic disorders. [18] In people with fibromyalgia, the association with sleep-disordered breathing such as apnea, sleep fragmentation and alternating cyclical oscillations of the sleep pattern and intrusion of alpha waves in non-REM sleep, has been studied for approximately two decades. [19]

Unfavorable muscular events have been associated with sleep disturbances in fibromyalgia, which favors oxyhemoglobin desaturation during sleep. [20] Thus, sleep disorders in fibromyalgia, in addition to playing an etiological role in chronic pain, also contribute to the perpetuation of the symptoms presented. The women evaluated in the present study presented poor sleep quality and an association between the Pittsburgh Sleep Index score and BMI, which constitutes an ideal scenario for the development of chronic health conditions associated with obesity, increasing the risk of morbidity and mortality, reducing life expectancy and favoring a reduction in physical and motor skills, in addition to the aspects involved in the multicausality of obesity, such as chronic pain. [21]

The metabolic impact of poor sleep quality on obesity can be explained by circadian misalignment, which is associated with inadequate control of plasma glucose levels and increased inflammatory proteins. Sleeping and eating outside the normal light-dark cycle is the main etiological factor of this misalignment. Poor sleep and eating at night influence the control of satiety and favor weight gain. [22]

The main stress response systems are the hypothalamic-pituitary-adrenal (HPA) axis and the sympathetic nervous system (SNS). Cortisol, a hormone produced and released by the adrenal gland and which follows the circadian cycle, has been identified in some studies that evaluated people with fibromyalgia, with normal morning cortisol levels (peak) and elevated evening cortisol levels (trough), resulting in a loss of the normal diurnal cortisol fluctuation [23-24], In addition, abnormal cortisol values were identified more prominently in patients with a longer duration (greater than 2 years) of the disease. [24]

These central neurohormonal abnormalities may contribute to the vulnerability of people with FM and to the development of cognitive changes, fatigue and sleep disorders. [25] The perpetuation of the problem favors physical deconditioning and worsening of the disease.

In view of what is described in the literature, it is plausible to assume that women with fibromyalgia and obesity have an increase in the problems related to these two chronic health conditions, impaired sleep quality and reduced life expectancy. Although we found a causal relationship between these variables and sleep quality in the proposed linear regression model, other variables that potentially impact sleep quality, such as anxiety, should be considered when evaluating people with fibromyalgia.

CONCLUSION

The proposed regression model demonstrated that FIQ and BMI independently negatively affect sleep quality. Therefore, therapeutic proposals for maintaining sleep quality in women with fibromyalgia should consider the effects of obesity.

DOI: https://doi.org/10.36489/saudecoletiva.2025v15i93p14793-14898

REFERENCES

1 . Marques AP, Espírito Santo AS, Bersaneti AA, Matsutani LA, Yuan SLK. Prevalence of fibromyalgia: literature review update. Rev Bras Reumatol. 2017;57(4):356-63.

2. Spaeth M, Rizzi M, Sarzi-Puttinni P. Fibromyalgia and sleep. Best Pract Res Clin Rheumatol. 2011;25(2):227-39.

3. Yunus MB, Ahles TA, Aldag JC, Masi AT. Relationship of clinical features with psychological status in primary fibromyalgia. Arthritis Rheum. 1991;34:15-21.

4. Kop WJ, Lyden A, Berlin AA, Ambrose K, Olsen C, Gracely RH, et al. Ambulatory monitoring of physical activity and symptoms in fibromyalgia and chronic fatigue syndrome. Arthritis Rheum. 2005;52:296-303.

5. Smith MT, Edwards RR, McCann UD, Haythornthwaite JA. The effects of sleep deprivation on pain inhibition and spontaneous pain in women. Sleep. 2007;30(4):494-505.

6. Branco J, Atalaia A, Paiva T. Sleep cycles and alpha-delta sleep in fibromyalgia syndrome. J Rheumatol. 1994;21(6):1113-7.

7. Cuneo RC, Judd S, Wallace JD, Perry-Keene D, Burger H, Lim-Tio S, Strauss B, Stockigt J, et al. The Australian multicenter trial of growth hormone (GH) treatment in GH-deficient adults. J Clin Endocrinol Metab. 1998;83(1):107-16.

8. Bennett RM, Cook DM, Clark SR, Burckhardt CS, Campbell SM. Hypothalamic-pituitary-insulin-like growth factor-I axis dysfunction in patients with fibromyalgia. J Rheumatol. 1997;24:1384-9.

9. Russel IJ. The promise of substance P inhibitors in fibromyalgia. Rheum Dis Clin North Am. 2002;28:353-65.

10. Andersen ML, Nascimento DC, Machado RB, Roizenblatt S, Moldofsky H, Tufik S. Sleep disturbance induced by substance P in mice. Behav Brain Res. 2006;167(2):212-8.

11. Wolf F, Ross K, Anderson J, Russell IJ, Hebert L. The prevalence and characteristics of fibromyalgia in the general population. Arthritis Rheum. 1995;38:19-28.

12. Moldofsky H. Management of sleep disorders in fibromyalgia. Rheum Dis Clin North Am. 2002;28:353-65.

13. Spiegel K, Tasali E, Penev P, Van Cauter E. Brief communication: sleep curtailment in healthy young men is associated with decreased leptin levels, elevated ghrelin levels, and increased hunger and appetite. Ann Intern Med. 2004;141:846-50.

14. Paiva ES, Heymann RE, Rezende MC, Helfenstein M Jr, Martinez JE, Provenza JR, Ranzolin A, Assis MR, et al. A Brazilian Portuguese version of the Revised Fibromyalgia Impact Questionnaire (FIQR): a validation study. Clin Rheumatol. 2013;32(8):1199-206.

15. Williamson A, Hogartt B. Pain: a review of three commonly used pain rating scales. J Clin Nurs. 2005;14(7):798-804.

16. Ruiz-Montero PJ, Segura-Jimenez V, Alvarez-Gallardo IC, Nijs J, Mannerkorpi K, Delgado-Fernandez M, van Wilgen CP, et al. Fibromyalgia Impact Score in women with fibromyalgia across Southern, Central, and Northern areas of Europe. Pain Physician. 2019;22(5):E511-6.

17. Scott AJ, Webb TL, Martyn-St James M, Rowse G, Weich S. Improving sleep quality leads to better mental health: A meta-analysis of randomised controlled trials. Sleep Med Rev. 2021;60:101556.

18. Chasens ER, Korytnik S, Liu M. Sleep and Metabolic Syndrome. Nurs Clin North Am. 2021;56(2):203-17. doi:10.1016/j.cnur.2020.10.012.

19. Molony RR, Cornish SM, Jacobson TR, Coleman WJ. Sleep, sleep apnea and the fibromyalgia syndrome. J Rheumatol. 1986;13(4):797-800.

20. Alvarez LB, Tishler L, Reeves DL, Fuller JC, Harris SJ. Fibromyalgia syndrome: overnight falls in arterial oxygen saturation. Am J Med. 1996;101(1):54-60.

21. Fusco SFB, Bandeira RM, Vieira SB. Anxiety, sleep quality, and binge eating in overweight or obese adults. Rev Esc Enferm USP. 2020;54:e03656. doi:10.1590/S1980-220X2019013903656.

22. Lee JH, Cho J. Sleep and Obesity. Sleep Med Clin. 2022;17(1):111-6. doi:10.1016/j.jsmc.2021.10.009.

23. Crofford LJ, Pillemer SR, Kalogeras KT. Hypothalamic-pituitary-adrenal axis perturbations in patients with fibromyalgia. Arthritis Rheum. 1994;37:1583-92.

24. McCain GA, Tilbe KS. Diurnal hormonal variation in fibromyalgia syndrome: a comparison with rheumatoid arthritis. J Rheumatol. 1989;16:154-7.

25. Crofford LJ, Demitrack MA. Evidence that abnormalities of central neurohormonal systems are key to understanding fibromyalgia and chronic fatigue syndrome. Rheum Dis Clin North Am. 1996;22(2):267-84.

DOI: https://doi.org/10.36489/saudecoletiva.2025v15i93p14793-14898