Cognitive Dysfunction in Patients with Fibromyalgia: A Multivariate Analysis

Disfunção Cognitiva em Pacientes com Fibromialgia: Uma Análise Multivariada

Disfunción Cognitiva en Pacientes con Fibromialgia: Un Análisis Multivariable

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Como citar: Wilsek LC, Weigert FP, Thomas TM, Rech EB, Schafranski MD. Cognitive Dysfunction in Patients with Fibromyalgia: A Multivariate Analysis. REVISA. 2026; 15(Esp.4): 125-132. Doi: https://doi.org/10.36239/revisa.v15.nEsp4.p125a132

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Recebido 27/01/2026
Aprovado: 22/03/2026

ORIGINAL

RESUMO

Objetivo: A fibromialgia é uma síndrome crônica caracterizada por múltiplos sintomas, incluindo déficits cognitivos que afetam a qualidade de vida. Este estudo transversal descritivo investigou fatores clínicos, funcionais e socioeconômicos associados ao comprometimento cognitivo em 84 pacientes com fibromialgia, utilizando o Questionário de Impacto da Fibromialgia (QIF), a Escala de Estresse Percebido (EPS-10), o Teste de Avaliação Cognitiva de Montreal (MoCA) e variáveis sociodemográficas. Por meio de análise multivariada, identificou-se que maior escolaridade esteve associada a melhor desempenho cognitivo, enquanto ansiedade e faltas ao trabalho se relacionaram a pior desempenho. Os resultados sugerem que fatores educacionais, emocionais e ocupacionais influenciam a função cognitiva, reforçando a importância de abordagens multidimensionais para preservá-la e melhorar a qualidade de vida.

Palavras-chave: Cognição; Fibromialgia; Qualidade de Vida.

ABSTRACT

Objevtive: Fibromyalgia is a chronic syndrome characterized by multiple symptoms, including cognitive deficits that affect quality of life. This descriptive cross-sectional study investigated clinical, functional, and socioeconomic factors associated with cognitive impairment in 84 fibromyalgia patients, using the Fibromyalgia Impact Questionnaire (FIQ), the Perceived Stress Scale (PSS-10), the Montreal Cognitive Assessment Test (MoCA), and sociodemographic variables. Through multivariate analysis, it was identified that higher education was associated with better cognitive performance, while anxiety and absence from work were related to worse performance. The results suggest that educational, emotional, and occupational factors influence cognitive function, reinforcing the importance of multidimensional approaches to preserving it and improving quality of life.

Keywords: Cognition; Fibromyalgia; Quality of Life.

RESUMEN

Objetivo: La fibromialgia es un síndrome crónico caracterizado por múltiples síntomas, incluyendo déficits cognitivos que afectan la calidad de vida. Este estudio descriptivo transversal investigó los factores clínicos, funcionales y socioeconómicos asociados con el deterioro cognitivo en 84 pacientes con fibromialgia, utilizando el Cuestionario de Impacto de la Fibromialgia (FIQ), la Escala de Estrés Percibido (PSS-10), la Prueba de Evaluación Cognitiva de Montreal (MoCA) y variables sociodemográficas. Mediante análisis multivariable, se identificó que una mayor educación se asociaba con un mejor rendimiento cognitivo, mientras que la ansiedad y el ausentismo laboral se relacionaban con un peor rendimiento. Los resultados sugieren que los factores educativos, emocionales y ocupacionales influyen en la función cognitiva, lo que refuerza la importancia de los enfoques multidimensionales para preservarla y mejorar la calidad de vida.

Palabras clave: Cognición; Fibromialgia; Calidad de Vida.

Introduction

Fibromyalgia (FM) is a chronic non-inflammatory syndrome, characterized by diffuse musculoskeletal pain and systemic symptoms, such as fatigue, sleep disturbances, depressive symptoms, and cognitive impairments.[1-3] The disease involves dysfunctions in central pain processing related to sensitization, neurochemical imbalances, and the interaction between genetic, neuroendocrine, and psychosocial factors.[4-5] It is estimated to affect about 2.5% of the world population, with a higher prevalence in women, especially between 30 and 50 years old.[6]

Among the symptoms, cognitive deficits—known as "fibrofog"—have attracted increasing attention.[7] Reported by 50% to 90% of patients, these impairments affect memory, attention, and executive functions, and can be described as more disabling than the pain itself, impacting professional performance, daily activities, and quality of life.[8-9] However, there is no consensus on the factors that influence these cognitive changes, which seem to result from the interaction between clinical, emotional, and functional aspects, making it essential to investigate these determinants to better understand cognitive impairment in FM.[7,10]

Objectives

This study aims to identify clinical, functional, and socioeconomic variables potentially involved in cognitive dysfunction in patients with FM. To this end, a multivariate statistical approach will be used, which will allow identifying which combinations of variables exert the greatest influence on cognitive performance. It is thus expected to contribute to a more comprehensive and integrated understanding of this phenomenon and provide subsidies for more effective management strategies.

Materials and Methods

This is a descriptive cross-sectional study, carried out between November 2023 and December 2024, with patients diagnosed with FM according to the American College of Rheumatology (2010) criteria, treated at "Chronic Pain" and "Rheumatology" outpatient clinics, at the Regional University Hospital of Campos Gerais (HURCG-UEPG). Patients aged 18 to 75 years, able to answer the applied questionnaires and who signed the Free and Informed Consent Form (FICF), were included, and those with other causes of chronic pain or with incomplete data were excluded. Sociodemographic data, presence of comorbidities, medication use, and physical activity practice were collected. Cognitive function was evaluated by the Montreal Cognitive Assessment Test (MoCA), complemented by the Fibromyalgia Impact Questionnaire (FIQ) and the Perceived Stress Scale-10 (PSS-10).

The data were described by measures of frequency, central tendency, and dispersion. Normality was verified by the Shapiro-Wilk test and the Student's T-test was used for comparisons. Correlations were evaluated by Pearson and Spearman

correlation tests. Multivariate analysis was conducted using multiple linear regression, using the backward stepwise method, which identified variables associated with cognitive performance, considering p<0.20 in the bivariate analysis. The analyses were conducted in RStudio (v. 24.12.1), with a significance level of 5%. The study was approved by the Research Ethics Committee of the State University of Ponta Grossa (nº 6.492.875).

Results

The sample included 84 patients, predominantly women (91.7%), aged between 46 and 60 years (63.1%), with low educational level (70.2%), without professional activity (69%), carriers of comorbidities (76.1%) and using medication (84.5%); 57.1% reported practicing physical activity. MoCA ranged between 6 and 27 points, with a mean of 16.2±4.6, with greater deficits in delayed recall, abstraction, visuospatial ability, attention, and language, and better performance in orientation and naming. The FIQ showed a mean of 74.3±14.6, highlighting pain, fatigue, anxiety, and reduced well-being. Perceived stress (PSS-10) showed a mean of 25.5±7.2 (Table I). In the bivariate analysis, schooling was significantly associated with cognitive performance, while FIQ and PSS-10 showed a significant negative correlation (Table II).

Table I - Descriptive analysis of the sample and performance on cognitive, functional, and psychosocial scales.

Variables	N (%)	Variables	Mean ± SD	Range
Gender		**MoCA**	16,2 ± 4,6	6-27
Female	77 (91,7%)	Visuospatial language	2,0 ± 1,3	0-5
Male	7 (8,3%)	Naming	2,3 ± 0,8	0-3
Faixa etária		Attention	2,6 ± 1,7	0-6
Adults	53 (63,1%)	Language	1,3 ± 1,0	0-3
Elderly	31 (36,9%)	Abstraction	0,6 ± 0,8	0-2
Ocupação		Delayed recall	1,2 ± 1,3	0-4
Yes	26 (31%)	Orientation	5,5 ± 0,7	3-6
No	58 (69%)	**FIQ**	74,3 ± 14,6	23,7-99,3
Schooling		Functional capacity	4,5 ± 2,8	0-10
Complete	25 (29,7%)	Feeling well	8,2 ± 2,6	0-10
Incomplete	59 (70,2%)	Absenteeism from work	4,3 ± 3,8	0-10
Comorbidities		Work capacity	7,6 ± 2,6	0-10
Yes	64 (76,1%)	Pain	8,8 ± 1,7	2-10
No	20 (23,8%)	Fatigue	8,0 ± 2,2	0-10
Medication		Morning tiredness	4,3 ± 3,2	0-10
Yes	71 (84,5%)	Muscle stiffness	7,4 ± 2,8	0-10
No	13 (15,4%)	Anxiety	8,1 ± 2,3	0-10
Physical Activity		Depression	7,5 ± 2,6	0-10
Yes	48 (57,1%)	**PSS-10**	25,5 ± 7,2	6-40
No	36 (42,9%)			

***Source**: Prepared by the author*

Table II - Cognitive performance according to clinical, sociodemographic, functional, and psychosocial variables.

Variables	Mean ± SD	p-value*	Variables	r value	p-value
Gender			**FIQ**		
Female	16,1 ± 4,6	p = 0,61	Total score	-0,40	p < 0,01[S]
Male	17,1 ± 4,5		Functional capacity	-0,25	p = 0,02 [S]
Age group			Feeling well	-0,25	p = 0,02 [S]
Adults	16,4 ± 4,6	p = 0,64	Absenteeism from work	-0,23	p = 0,03 [S]
Elderly	15,9 ± 4,6		Work capacity	-0,44	p < 0,01 [S]
Occupation			Pain	-0,19	p = 0,08 [S]
Yes	17,5 ± 4,3	p = 0,06	Fatigue	-0,25	p = 0,02 [S]
No	15,6 ± 4,7		Morning tiredness	-0,15	p = 0,17 [S]
Schooling			Muscle stiffness	-0,24	p = 0,03 [S]
Complete	19,3 ± 4,3	p < 0,01	Anxiety	-0,35	p < 0,01 [S]
Incomplete	14,8 ± 4,1		Depression	-0,31	p < 0,01 [S]
Comorbidities					
Yes	16,2 ± 4,6	p = 0,96	**PSS-10**		
No	16,3 ± 4,6		Total score	-0,24	p = 0,03[P]
Medication					
Yes	16,3 ± 4,6	p = 0,77			
No	15,8 ± 4,9				
Physical activity					
Yes	16,5 ± 4,4	p = 0,58			
No	15,9 ± 4,8				

***Source**: Prepared by the author*

Legend: * = Student's t-test; r = correlation coefficient; S= Spearman's correlation test; P= Pearson's correlation test.

In the final multiple linear regression model, schooling was positively associated with cognitive performance (R=4.58; p<0.001), while anxiety (R=−0.44; p=0.028) and absenteeism from work (R=−0.26; p=0.033) showed negative associations. Morning tiredness showed a negative trend (R=−0.20), but without statistical significance (p=0.141). This model was significant and explained 34.4% of the MoCA score variance (R2=0.344; Adjusted R2=0.310) (Table III).

Table III - Multiple linear regression model for MoCA score.

Variable	Regression Coefficient (R)	95% CI	p-value	Adjusted R²
Intercept	20,36	-	-	
Schooling	4,58	[2.73, 6.43]	<0,001	
Anxiety	-0,44	[-0.82, -0.04]	0,028	0,310
Absenteeism from work	-0,26	[-0.49, -0.02]	0,033	
Morning tiredness	-0,20	[-0.46, 0.06]	0,141	

***Source**: The author.*

Discussion

In this study, the scores obtained on the MoCA evidenced cognitive impairment in a large part of the sample, with global and specific deficits, especially in tasks of delayed recall and executive functions, corroborating previous findings that describe slowed processing, alterations in thought organization, and attentional deficits.[9,11-13] In the multivariate analysis, schooling, anxiety, and absenteeism from work emerged as the main predictors, while pain, depression, and stress did not remain significant, indicating an indirect influence of these factors on cognitive impairment.[14] Morning tiredness also did not present relevance as a direct predictor, but may reflect sleep disturbances, aiding in the adjustment of the model, although the relationship between sleep and cognition is heterogeneous and influenced by clinical and methodological differences.[7,15-17]

Among the variables analyzed, schooling stood out as the most consistent predictor, possibly due to cognitive reserve (CR), which provides greater synaptic connectivity, use of compensatory strategies, and cognitive efficiency, reducing the impact of FM on neuropsychological function.[18] Longitudinal studies reinforce this perspective, highlighting schooling as one of the most important dimensions of CR, configuring itself as an essential neurofunctional marker to mitigate cognitive decline, including in FM.[19-20]

Anxiety presented a significant inverse association with cognitive performance, possibly related to neurochemical alterations (reduction of serotonin, norepinephrine, and dopamine, in addition to increased cortisol) and the overlap of brain circuits involved in both emotional regulation and cognition, favoring attention and memory deficits.[21-22] However, the literature presents divergent results; while some studies point to deficits, especially in working memory, others do not show significant associations, suggesting that this relationship is heterogeneous and modulated by clinical, psychological, and methodological factors.[7-8,13,23]

Absenteeism was also associated with worse cognitive performance, possibly due to the loss of routine, isolation, and less intellectual and social stimulus, configuring itself as a marker of cognitive and socioeconomic vulnerability. Although many patients remain fit for work, labor insertion, especially for women, is fragile due to rigid environments, stigmatization, and feelings of inadequacy, contributing to higher rates of unemployment and disability retirement. International evidence corroborates that absenteeism is associated with symptom severity, while greater social support is linked to better cognitive function and fewer absences.[16,24]

Finally, despite the study's contributions, the results should be considered in terms of potential limitations such as a small sample, cross-sectional design, absence of a control group, use of self-reports and a single cognitive test, in addition to the non-inclusion of psychiatric factors. Such restrictions do not invalidate the results but emphasize the need for longitudinal investigations, with larger samples and more comprehensive neuropsychological protocols, in order to deepen the understanding of the relationship between fibromyalgia and cognitive dysfunction.

Conclusion

In synthesis, cognitive impairment in fibromyalgia results from multiple factors, with schooling being a protective factor and anxiety and absenteeism being predictors of worse performance. These results evidence the need for integrated strategies that contemplate psychosocial support, anxiety management, occupational reinsertion, cognitive rehabilitation, and stimulation of intellectual activities, aiming to preserve cognitive function and quality of life. Thus, this study expands the understanding of the interface between fibromyalgia and cognition, providing subsidies for more comprehensive interventions and the advancement of future research.

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