








Evaluation of functionality and socioeconomic status of patients with chronic pain

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SUMMARY

OBJECTIVE: This study aimed to evaluate the influence of chronic pain on functionality and its consequences on work and patient income.

METHODS: A total of 103 patients from the Multidisciplinary Pain Center of the Clinics Hospital of Universidade Federal de Minas Gerais were interviewed between January 2020 and June 2021, applying questionnaires on mobile devices. Socioeconomic data, multidimensional characterization of pain, and instruments for assessing pain functionality and intensity were analyzed. Pain intensity was categorized as mild, moderate, or intense for comparative analysis. Ordinal logistic regression was used to identify risk factors and variables that jointly influence the outcome of pain intensity.

RESULTS: The patients had a median age of 55 years, were predominantly female, married or in a stable relationship, white race, and completed high school. The median family income was R\$2,200. Most patients were retired due to disability and pain-related causes. Functionality analysis showed severe disability directly associated with pain intensity. The financial impacts observed were correlated with the pain intensity of the patients. Age was a risk factor for pain intensity, while sex, family income, and duration of pain served as protective factors.

CONCLUSION: Chronic pain was associated with severe disability, decreased productivity, and exit from the labor market, with a negative impact on financial condition. Age, sex, family income, and duration of pain were directly associated with pain intensity.

KEYWORDS: Chronic pain. Income. Disability evaluation. Retirement. Sick leave.

INTRODUCTION

By definition, according to the International Association for the Study of Pain, pain is “an unpleasant sensory and emotional experience associated, or similar to that associated, with a real or potential tissue injury”¹. It is recognized as chronic when it lasts or recurs for a period longer than 3 months, causing impairment in functionality, social and psychological well-being, and the financial life of patients.

Global data indicate that the prevalence of chronic pain is, on average, 28%². In Brazil, there is great regional variability in this rate: in Londrina, the prevalence was 51.44%; in Salvador, this rate was 41.4%³; in São Paulo, it was 28.7%⁴. Despite these findings, less is known about the epidemiological aspects of patients with chronic pain in Brazil.

According to the World Health Organization (WHO), the definition of the term disability refers to the scope of the various manifestations of a disease, resulting from the interaction between the organic or structural dysfunction presented by the

individual, the limitation of their activities, and the restriction in social participation, determining impairments in the functions of the body and difficulties in performing the tasks of daily living. When work becomes a burden for patients, there is greater use of the social benefits of sick leave and early retirement⁵, especially in developing countries, such as Brazil.

Socioeconomic status is a determinant of health that is directly associated with the experience of pain^{6,7}. Among the indicators of this status that showed a relationship with chronic pain are education, employment status, financial difficulties, and income⁷⁻⁹. Given the complexity of pain, studies capable of evaluating its impact are important for understanding the epidemiological scenario of pain and allowing a broad view of the current scenario, providing support for the planning and direction of strategic preventive actions of health services. Therefore, the objective of this study was to examine the relationship between chronic pain and functionality and to evaluate the labor situation, income, and financial changes resulting from pain.

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METHODS

This is an observational, cross-sectional, noncontrolled, and descriptive study conducted at the Pain Center of the Clinics Hospital of the Universidade Federal de Minas Gerais. The study followed the ethical standards of Resolution no. 196/96 of the National Health Council and was approved by the Research Ethics Committee (no. 21291119.0.0000.5149). To participate in this study, participants signed an informed consent form.

Data were collected during an interview from 2020 to 2021. Instruments were used to evaluate pain intensity (*visual numerical scale* – VNS) and functionality (*The Pain Disability Questionnaire* – PDQ). For the categorization of pain intensity (VNS), the patients who answered 0, 1, 2, or 3 were classified as mild pain; those who answered 4, 5, 6, or 7 were classified as moderate pain; and those who answered 8, 9, or 10 were classified as severe pain. The sample was defined by convenience and totaled 103 patients.

A total of 103 patients were interviewed. Patients of both sexes, older than 18 years, and with cognitive deficits were excluded from the study.

For the statistical analysis, an exploratory analysis was initially performed using the *Shapiro-Wilk* test. The comparative analyses were performed using the *Kruskal-Wallis* test, followed by the Dunn post-test. The correlation analyses were performed using the *Spearman's* test. Variables with a level of statistical significance ($p \leq 0.05$) remained in the final multivariate logistic model. The strength of the association was determined by the *odds ratio* (OR), with a 95% confidence interval (CI). The likelihood ratio test was used to define and fit the final model.

Statistical analyses were performed using *GraphPad Prism*[®] software (GraphPad Software, version 8.0, La Jolla, CA, USA, www.graphpad.com) for Windows and *Stata*[®] software (version 14.0, Stata Corp., College Station, TX, USA).

RESULTS

The sociodemographic characterization is evaluated in Table 1.

Regarding the work situation, most patients (34.95%) were retired due to disability. In 63.89% of these patients, disability was related to pain. The second most cited labor situation by patients was sick leave (22.33%), followed by unemployed (13.59%). Together, these three categories accounted for 70.87% of the sample. There was no difference in relation to the labor situation when the different categories of pain were considered ($p > 0.05$).

In the general population ($n=103$), the median pain time was 60 months. Considering the intensity of pain, patients in the intense pain group had a median time of pain higher than

that presented by the patients in the moderate pain group. In the general population, most patients (29.13%) reported having this pain for 10 years or more. In patients with severe pain, this condition was observed in 41.30% of the sample. According to the EVN pain scale, the median score obtained by the general population was six. Of the total number of patients analyzed, 44.66% ($n=46$) reported severe pain. There were no significant differences between the groups in this study regarding frequency, location, and cause of pain ($p > 0.05$).

The classification of the functionality of the patients, according to the PDQ instrument, indicated a severe degree of disability in the general study population, with a mean total score of 96 points. In the group with moderate pain, the mean total score on the PDQ was 87 points (severe disability), and in patients with mild pain, it was 50 points (moderate disability). By stratifying patients according to pain intensity, it was possible to observe that the group of patients with mild pain showed better results in all items of this instrument ($p < 0.05$) (Table 2).

Most participants (74.76%) reported that they suffered some financial impact due to pain. Regarding the type of financial difficulty, the patients reported increased spending on health (37.40%), retirement or sick leave (35.77%), unemployment (13.01%), and decreased income (13.82%). Again, there was no significant difference between the groups categorized by pain intensity ($p > 0.05$). According to the results obtained, patients in the mild pain group showed a moderate negative correlation between the presence of financial difficulties and the location of pain ($p=0.042$ and $r=-0.592$). In the intense pain group, the financial changes were directly correlated with the cause of pain ($p=0.028$ and $r=0.323$). The other variables used to characterize the pain were not significantly correlated with the presence of financial changes ($p > 0.05$).

According to the final result of multivariate analysis, the variable age (age groups 18–40 years and 61–80 years) was 2.5 times more likely to be associated with pain intensity than patients aged 41–60 years. Conversely, males were 0.3 times less likely to have high levels of pain than females. Patients with family income above two minimum wages were 0.5 times less likely to have intense levels of pain compared to patients receiving up to one minimum wage. Time was also associated with pain intensity: patients with shorter pain duration were 0.3 times less likely to have intense levels of pain compared to patients with long periods of pain (Table 3).

DISCUSSION

Pain is considered a serious public health problem worldwide¹⁰. Considering that prolonged pain compromises the health

Table 1. Sociodemographic characteristics of the study population, considering the general sample and pain intensity (mild, moderate, and severe).

Variable	Overall (n=103)		Mild pain (n=12)		Moderate pain (n=45)		Severe pain (n=46)		p-value
	n	%	n	%	n	%	n	%	
Age (years)									
Median (P25–P75)	55 (48–63)		56 (39.5–61)		56 (51–64)		54 (47–61)		0.224 ^{kw}
Min–Max	22–79		22–67		35–79		26–77		
18–30	4	3.88	2	16.67	-	-	2	4.35	0.064 ^{kw}
31–40	5	4.85	1	8.33	2	4.44	2	4.35	
41–50	24	23.30	2	16.67	8	17.78	14	30.43	
51–60	35	33.98	4	33.33	15	33.33	16	34.78	
61–70	25	24.27	2	16.67	14	31.11	9	19.57	
71–80	10	9.71	1	8.33	6	13.33	3	6.52	
Sex (n=103)									
Female	75	72.82	8	66.67	31	68.89	36	78.26	0.534 ^{kw}
Male	28	27.18	4	33.33	14	31.11	10	21.74	
Marital status (n=103)									
Married or stable relationship	59	57.28	4	33.33	32	71.11	23	50.00	0.041 ^{a, kw}
Single	24	23.30	5	41.67	6	13.33	13	28.26	
Separate or divorced	13	12.62	2	16.67	4	8.89	7	15.22	
Widowed	7	6.80	1	8.33	3	6.67	3	6.52	
Race (n=103)									
White	41	39.81	2	16.66	17	37.78	22	47.83	0.411 ^{kw}
Brown	38	36.89	5	41.67	17	37.78	16	34.78	
Black	23	22.33	5	41.67	10	22.22	8	17.39	
Asian	1	0.97	-	-	1	2.22	-	-	
Schooling (n=103)									
Illiterate	3	2.91	-	-	2	4.44	1	2.17	0.958 ^{kw}
Complete elementary education	21	20.39	3	25.00	10	22.22	8	17.39	
Incomplete elementary education	29	28.16	3	25.00	10	22.22	16	34.78	
Complete high school	35	33.98	5	41.67	17	37.78	13	28.26	
Incomplete high school	5	4.85	-	-	3	6.67	2	4.35	
Technical training	3	2.91	-	-	1	2.22	2	4.35	
Complete Higher Education	6	5.83	1	8.33	2	4.44	3	6.52	
Incomplete Higher Education	1	0.97	-	-	-	-	1	2.17	
Income (R\$)									
Median (P25–P75)	R\$ 2.200 (R\$ 1.100–2.200)		R\$ 1.650 (1.100–2.200)		R\$ 2.200 (1.100–3.300)		R\$ 1.100 (1.100–2.200)		0.065 ^{kw}
Min–Max	R\$ 275–16.500		R\$ 275–4.400		R\$ 275–16.500		R\$ 275–5.500		
Up to 1 minimum wage	46	44.66	6	50.00	16	35.56	24	52.17	0.196 ^{kw}
1–2 minimum wages	32	31.07	4	33.34	13	28.89	15	32.61	
2–3 minimum wages	17	16.50	1	8.34	11	24.44	5	10.87	
>4 minimum wages	8	7.77	1	8.34	5	11.11	2	4.35	

^aSignificant p-values. Differences were observed between mild and moderate pain. ^{kw}Kruskal-Wallis test.

condition and functional capacity, the present study evaluated this relationship, as well as the work situation, income, and financial changes resulting from the pain.

The analysis of sociodemographic characteristics revealed that most participants had a profile of severe or moderate pain, with a median age of 55 years, and were predominantly female. Most patients were white and had completed high school. Previous studies described that populations affected by chronic pain had characteristics similar to those observed in the present study¹¹.

The number of female and male patients was not homogeneous in the present study, precluding a direct correlation analysis between the determining factors for pain and sex. However, the results obtained in the multivariate logistic regression analysis identified the male sex as a protective factor for severe pain compared to the female sex.

The results obtained in the multivariate analysis also indicated that the age groups 18–40 and 61–80 years were more likely to be associated with pain intensity. This result can be explained by the fact that in older patients, chronic pain seems to be associated with diseases and conditions typical of older age, while in younger patients, the demands at work could determine more intense pain. Previous studies are inconclusive on the influence of age on pain intensity¹².

Among the work situations observed in the present study, retirement due to disability, sick leave, and unemployment were the classes most presented by the studied sample. The significant number of patients receiving some type of social benefit presented in this study demonstrates the direct implications of pain for the economy. The unemployment rates presented in this study are higher than the unemployment rates of the Brazilian population according to the Continuous National Household Sample Survey in 2019¹³. This relationship between chronic pain and unemployment is complex. There may also be underemployment, reduced working hours, loss of productivity, and frequent changes in employment. In women, unemployment raises concerns about family stability, exacerbating pain while men show the opposite data⁹. It is important to note that, according to the Institute of Applied Economic Research

(IPEA), in 2019, women commanded 45% of Brazilian households, being the main contributor to family income. In this study, the unemployed and retired population by contribution or age had a lower association with pain intensity. This could be explained by the demands of the professional function, with work activity leading to more severe pain. In this context, retirement or lack of employment would represent protective factors, as they ensure lower physical demand.

In the multivariate analysis, income above two minimum wages served as a protective factor for severe pain. This finding indicates that the higher the family income is, the less intense the patient's pain tends to be. Several authors state that chronic pain is more common in less privileged segments of the population and that low income is consistently related to increased pain^{9,14}. Andersson et al. (1993) correlated chronic pain with low income; however, according to Gerdle et al. (2004), annual income should be seen as a consequence and not only as a predictor of pain⁶. Although the educational level in the present study was not significant, this parameter is often related to chronic pain.

Socioeconomic indicators assess the status of the patient to obtain resources but fail to evaluate the financial needs, responsibilities, and obligations. The presence of economic difficulties

Table 3. Ordinal logistic regression (factors associated with pain intensity-visual numerical scale): final model.

Ordinal logistics regression (variable answer=VNS) final model**			
Explanatory variables	Odds ratio	95%CI	p-value
Age (categories)	2.5	1.0–6.2	0.053*
Sex	0.3	0.1–0.9	0.033*
Race/color	0.6	0.3–1.1	0.097
Family income	0.5	0.2–0.8	0.010*
Financial changes	1.4	0.9–2.3	0.153
Work status	0.6	0.3–1.0	0.069
Time of pain (categories)	0.3	0.1–1.0	0.046*
PDQ_total index	1.0	1.0–1.1	0.005*

*Significant p-values ($p < 0.05$). **Likelihood log=-60.177/Observation number=90/Pseudo-R²=0.327.

Table 2. Characterization of disability, according to Pain Disability Questionnaire instruments.

Instrument	Overall population (n=103)	Mild pain (n=12)	Moderate pain (n=45)	Severe pain (n=46)	p-value
	Median	Median	Median	Median	
PDQ					
Psychosocial component	40.0 ^c	23.0 ^{a,b,c}	36.0 ^b	40.0 ^a	0.000*
Functional status	58.0 ^c	27.0 ^{a,b,c}	49.0 ^b	58.0 ^a	<0.0001*
Total index	96.0 ^c	50.0 ^{a,b,c}	87.0 ^b	96 ^a	<0.0001*

*Significant p-values. ^aSignificant differences were observed between the mild pain and severe pain groups. ^bSignificant differences were observed between the mild pain and moderate pain groups. ^cSignificant differences were observed between the mild and general pain groups.

is closely linked to socioeconomic status, representing a personal perception, and an important determinant of disability and psychological distress. In this study, most participants reported the occurrence of some negative impact on their financial life. Low income, therefore, behaves as a risk factor for the development of pain and, at the same time, can be negatively influenced by pain, which is a bidirectional variable^{6,9,14}.

When analyzing income and the variables that characterize pain, in patients with mild pain, the financial changes were negatively correlated with the location of pain, suggesting that the greatest financial impacts occurred in patients with a particular location of pain. This fact can be explained by a relationship between the location of pain and the demands of professional practice. Thus, even though pain is considered mild, its occupational function could lead to significant impacts. In the severe pain group, the financial changes were directly correlated with the cause of pain, suggesting that some etiologies have a greater impact on the patients' functionality for work. The analysis of the duration of pain, in turn, revealed a median period of 60 months, and this result was also observed in previous studies¹⁵. In the multivariate analysis, pain time served as a protective variable for pain intensity because patients with shorter pain time had lower chances of severe pain. This finding corroborates the comparative analysis, where the intense pain group exhibited significantly longer pain time, suggesting an increase in intensity as the duration of pain increases.

The results showed a severe change in functionality. According to the data obtained in the comparative analysis between the groups, the degree of disability was related to the intensity of pain, suggesting that the higher the intensity, the greater the

interference in the functionality of patients. Dorner et al. (2011) reported that the level of disability is a good way to measure the severity of pain.

CONCLUSION

Chronic pain was associated with changes in the functionality of patients, characterized by a severe degree of physical and psychosocial disability. A large portion of the patients analyzed was outside the labor market and received social security benefits due to early retirement or sick leave. Chronic pain had a strong negative impact on the financial condition of patients, and among the variables analyzed, age, sex, family income, and duration of pain were directly associated with pain intensity.

Limitations

The study is cross sectional, and the sample was limited to a single study center, defined by convenience, and was not homogeneous in relation to gender.

AUTHORS' CONTRIBUTIONS

MSSC: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Resources, Project administration, Writing – original draft. **GRCL:** Investigation, Formal Analysis, Methodology, Visualization. **AFQA:** Investigation, Formal Analysis, Methodology, Visualization. **JMGA:** Data curation, Formal Analysis, Validation, Visualization. **FRF:** Data curation, Formal Analysis, Validation, Visualization. **LMA:** Data curation, Formal Analysis, Validation, Visualization. **RSG:** Methodology, Supervision, Validation, Writing – review & editing.

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