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Chronic pain is associated with increased health care use among community-dwelling older adults in Brazil: the Pain in the Elderly (PAINEL) Study

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Abstract

Background. Chronic pain is known to increase health care use in high-income countries, but in Brazil, little is known.

Objective. To investigate the association between chronic pain and health care use among Brazilian older adults and explore the relationship between pain severity and health care use.

Methods. This cross-sectional study was derived from the population-based study Frailty in Brazilian Older People-FIBRA. Chronic pain, pain intensity and pain-related disability were assessed through additional telephone interviews. Health care use was measured by the number of doctor visits, hospitalization events and high health care use (highest quartile of the distribution for number of doctor visits) in the last 12 months. Associations were tested in regression analyses adjusted for predisposing, enabling and illness-level components from the Andersen Model.

Results. The 383 participants were predominantly female (71.0%), mean age was 75.6 (6.1 SD). The prevalence of chronic pain was 30.0%. Chronic pain was associated with number of doctor visits [unstandardized B coefficient 1.48; 95% confidence interval (CI) = 0.35–2.62] and high health care use [odds ratios (OR) = 2.27; 95% CI = 1.39–3.72]. Pain intensity was associated with high health care use in univariate (OR = 1.13; 95% CI = 1.06–1.20) but not multivariate analysis (OR = 1.12; 95% CI = 0.94–1.33). Pain-related disability was not associated with any outcome.

Conclusion. Chronic pain increased health care use among Brazilian older adults. Improving the quality of primary care management of individuals at greater risk of chronic pain should be a cornerstone of health policies directed towards reducing the personal and societal burden of ageing.

Key words: Ageing, chronic pain, developing countries, epidemiology, health services.

Introduction

Demographic ageing has been occurring steeply in non-high-income countries. The increase in the proportion of the elderly population results in a higher demand for health services and higher health care costs [1], constituting a scenario that has raised deep concerns about the sustainability of health care systems throughout the developing world [2].

In older adults, increased health care use is a key indicator of poorer general health and a known predictor of adverse outcomes, such as institutionalization [3]. Evidence from studies conducted in high-income countries has revealed that the presence of comorbid chronic pain is responsible for an important rise in the demand for health services [4–6] and is one of the top contributors to the increase in multimorbidity-related health care costs [7]. Chronic pain is a highly burdensome condition, generally defined as a persistent pain episode that lasts for >6 months [8]. It is known to impose negative effects on the overall quality of life [9], functioning [9,10] and social and working life [9]. Worldwide age-standardized estimates for the 1-year prevalence of chronic pain range from 37% to 41.1% [11], and the costs attributed to painful musculoskeletal conditions (e.g. chronic joint pain or arthritis) have been estimated to reach US $635 billion per year [12]. In individuals 65 years and older, the presence of chronic pain has shown to produce health care costs of magnitude ~11% higher when compared with the average cost of those without chronic pain [13].

The management of highly prevalent pain conditions (e.g. back pain) should preferably begin in primary care [14], where GPs have a leading role in providing effective first-line treatment and avoiding the waste of health care resources in unnecessary testing, specialist referral or surgery [15]. This is particularly important in countries where universal health coverage (UHC) is offered and those committed to moving towards UHC. In Brazil, UHC serves as the foundation of the Brazilian Unified Health System (*Sistema Único de Saúde*; SUS), which was instituted by the 1988 constitution and is based on the principle of health as a citizen's right and the state's duty [16]. Currently, the Brazilian health system includes a public–private mix, with over 70% of the population depending on public health care and the remaining sector (the wealthiest) covered by private health plans [16,17].

Nearly 10% of Brazil's gross domestic product (GDP) is spent on health [18], and an increase by >4% is expected before 2050 [19]. Chronic pain is likely to account for an important proportion of these projected costs, given that up to 85% of Brazilians aged 65 years and over are expected to have chronic pain [20], with back pain being the most common comorbidity present in pairs and triplets of chronic diseases [21]. Despite this major fiscal challenge, little is known about how chronic pain affects the pattern of health care use among Brazilian older adults [22,23]. The aim of this study was to investigate the association between chronic pain and health care use among community-dwelling older adults in Brazil and explore the relationship between pain severity and health care use.

Methods

Study design and participants

The Pain in the Elderly (PAINEL) Study consisted of a cross-sectional survey on the prevalence of musculoskeletal disorders among community-dwelling older adults living in Belo Horizonte, a large capital city in Southeast Brazil. Its sample was derived from the population-based study Frailty in Brazilian Older People-FIBRA, in the Federal University of Minas Gerais (UFMG) pole. Recruitment was based on a probability sample of 1640 households within 15 clusters (census tracts) distributed across the city of Belo Horizonte [24]. Details on

sampling and recruitment are described elsewhere [25]. The study was approved by the Research and Ethics Committee of UFMG (COEP, process number ETIC 187/07).

Participants of the PAINEL study included male and female community-dwelling older adults aged 65 years and over, actively enrolled in FIBRA Study and without any of the following: severe cognitive impairment (<17 points in the Mini–Mental State Examination) [26], transient or permanent bedridden status, wheelchair confinement, severe stroke sequelae, neurological disorders that hindered their performance on tests. Data collection was implemented in two stages. First, information on sociodemographic, physical, lifestyle and psychological characteristics was collected through face-to-face assessments within the scope of FIBRA Study (2008–09). In a second stage, additional information on musculoskeletal health was collected through telephone by five trained interviewers (2010–11). Eligible participants who did not complete the telephone interview on musculoskeletal health were excluded from the present investigation.

Measurement of health care use and chronic pain

Health care use was assessed through participants' report on the number of doctor visits (to primary care doctors or any medical specialty) and any hospitalization during the last 12 months, irrespective of reason for visit or hospital admission. An indicator of high health care use was computed by categorizing the number of doctor visits into quartiles and then using the highest quartile of the distribution as a cut-off. Hospitalization was defined as a minimum of one night's stay in hospital.

Chronic pain was identified by the report of continuous or intermittent pain of any type, lasting for at least 6 months in the last 12 months and that had not recovered for 30 consecutive days. Participants reporting chronic pain were enquired about the presence of pain-related disability through the question 'Is your pain bad enough to limit your usual activities or change your daily routine for >1 day?'. They were also asked to rate the average intensity of chronic pain over the last 12 months on a 0–10-point scale, where 0 means no pain and 10 means the worst pain possible.

Assessment of possible confounders

Individual determinants of health services utilization that could potentially confound the association between chronic pain and health care use were assessed and used for analyses adjustment. These were selected according to the Andersen model [27], which theorizes that multiple determinants interact both directly and through the resources and organization of health services systems. Individual determinants in this framework include characteristics that precede the onset of episodes of illness (predisposing components), conditions that make health service resources available to individuals (enabling components) and perceived illness (illness-level components) [27]. Our analyses considered the predisposing components sex, age, years of education and marital status, the enabling component private health insurance, and illness-level components body mass index (BMI), multimorbidity, level of functioning, sleep duration and depressive symptoms.

BMI was calculated by objectively measured weight and height. Participants reporting a doctor's diagnosis of two or more of the following diseases in the past year were considered multimorbid [28]: cardiovascular disease, hypertension, stroke, diabetes, cancer and chronic pulmonary disease. The Katz index validated to Portuguese-Brazil was used to access function [29]. The index quantifies the independence level in six basic activities of daily living on

a 0 (independent in all activities) to 6 (dependent on all activities) scale (30). The Geriatric Depression Scale (GDS-15, 0–15 points) was used to screen for depressive symptoms in the last week (31).

For analyses purposes, continuous scores of validated questionnaires and scales (i.e. Katz index and GDS-15) were maintained in order to avoid loss of power and residual confounding (32). Some variables were dichotomized in order to reflect more accurately the construct under investigation. Marital status was dichotomized into living with a significant other (being married or living with a companion) and other arrangements (33). Sleep duration was categorized into short (6.0 hours or less), mid (from 6.1 to 8.9 hours) and long (9.0 hours or more), and short and long durations were grouped under the label 'inadequate sleep duration'. This procedure is in accordance with current evidence on the detrimental effects on health of both short and long sleep duration in elders (34).

Statistical analyses

Descriptive statistics were used to characterize the study sample. Linear and logistic regression analyses were used to investigate associations between the presence of chronic pain and health care use, which referred to the use of health services during the past year in terms of the number of doctor visits (continuous variable), hospitalization and high health care use (dichotomous variables). When a significant association was present in unadjusted analyses ($P < 0.05$), the association was tested in a multivariate regression model adjusted by confounders that were selected for inclusion if they showed univariate associations with the respective dependent variable at $P < 0.10$. Statistical significance for the final models, computed by the Wald statistic, was set at $P < 0.05$. Results for linear regressions were presented as unstandardized B coefficients and 95% confidence interval (CI), and for logistic regressions as odds ratios (OR) and 95% CI. Similar procedures were used to explore the relationship of health care use with disabling chronic pain and pain intensity in the subsample reporting chronic pain. SPSS statistical package (version 20.0, SPSS, Chicago, IL) was used for all analyses.

Results

From 601 older adults living in Belo Horizonte who were actively enrolled in FIBRA Study, 383 (63.7%) were eligible for inclusion. A schematic description on the flow of participants from original recruitment in the population-based study until inclusion in the PAINEL Study is published elsewhere (35). Reasons for exclusion were impossible to contact/no telephone line ($N = 124$), confined to bed/hearing deficit ($N = 36$), refused to participate in the musculoskeletal interview ($N = 58$).

Nearly all participants (95.3%) visited a doctor in the last 12 months, and 17.0% had a hospitalization in the same period. The mean number of doctor visits was 4.8 (5.1 SD). High health care use (≥ 6 doctor visits in the last 12 months) was reported by 26.6% of the participants. The overall prevalence of chronic pain was 30.0%. Nearly half (48.2%) of those with chronic pain had pain-related disability, and 52.2% reported severe pain intensity ($\geq 8/10$ points, mean = 7.3 ± 2.4 SD). Characteristics of the included participants are presented in Table 1.

In univariate analyses, chronic pain was associated with number of doctor visits in the last 12 months (unstandardized B coefficient = 2.17; 95% CI = 1.06–3.27; $P < 0.001$) and high health care use (OR = 2.52; 95% CI = 1.57–4.06; $P < 0.001$), but not with hospitalization (OR = 1.72; 95% CI = 0.99–3.0; $P = 0.056$). Statistically significant univariate associations remained significant after adjustment for confounding factors (Table 2).

In the subsample with chronic pain, pain-related disability was not associated with any measure of health care use in univariate analyses: number of doctor visits (unstandardized B coefficient = 0.52; 95% CI = −2.11 to 3.15; $P = 0.699$), hospitalization (OR = 1.34; 95% CI = 0.56–3.22; $P = 0.516$), high health care use (OR = 0.97; 95% CI = 0.46–2.06; $P = 0.941$). When the relationship between chronic pain intensity and health care use was explored, univariate estimates were not significant for number of doctor visits (unstandardized B coefficient = 0.30; 95% CI = −0.24 to 0.83; $P = 0.271$)

Table 1. Characteristics of participants according to health care use in the last 12 months. The PAINEL study

	Overall N = 383	Number of doctor visits				Hospitalization		High health care use	
		0	1–2	3–4	>4	No	Yes	No	Yes
Female sex	71.0%	3.3%	26.1%	30.9%	39.7%	82.7%	17.3%	72.1%	27.9%
Age	75.6 (6.1)	75.0 (6.2)	76.5 (6.4)	74.7 (5.5)	75.7 (6.3)	75.3 (5.7)	77.1 (7.5)	75.6 (6.0)	75.6 (6.4)
Years of education	6.3 (5.2)	4.3 (1.8)	6.0 (4.9)	6.8 (6.0)	6.4 (4.8)	6.2 (5.1)	6.8 (5.4)	6.2 (5.2)	6.6 (5.1)
Living with significant other	48.0%	4.9%	28.8%	29.3%	37.0%	85.9%	14.1%	75.0%	25.0%
BMI[a]	27.3 (4.9)	25.7 (4.2)	26.6 (4.5)	27.3 (5.0)	28.0 (5.1)	27.2 (4.8)	27.7 (5.4)	27.1 (4.8)	27.7 (5.2)
Multimorbidity[a]	24.6%	1.1%	21.3%	28.7%	48.9%	68.1%	31.9%	62.8%	37.2%
Katz index (0–6 scale)	0.2 (0.5)	0.1 (0.2)	0.1 (0.3)	0.2 (0.4)	0.2 (0.6)	0.1 (0.3)	0.4 (0.8)	0.2 (0.4)	0.2 (0.7)
Depressive symptoms (0–15 scale)	7.2 (1.8)	6.7 (1.4)	7.1 (1.7)	6.9 (1.7)	7.5 (1.9)	7.1 (1.7)	7.8 (2.0)	7.1 (1.7)	7.4 (1.9)
Inadequate sleep[b]	54.7%	4.3%	29.3%	27.4%	38.9%	81.7%	18.3%	71.2%	28.8%
Private health insurance	64.8%	2.4%	23.4%	30.2%	44.0%	81.5%	18.5%	67.7%	32.3%
Chronic pain	30.0%	1.7%	21.7%	25.2%	51.3%	77.4%	22.6%	60.0%	40.0%
Pain-related disability[c,d]	48.2%	1.8%	20.0%	29.1%	49.1%	74.5%	25.5%	60.0%	40.0%
Pain intensity[c]	7.3 (2.4)	6.0 (1.4)	7.6 (2.1)	6.7 (2.6)	7.6 (2.5)	7.3 (2.5)	7.6 (2.5)	7.1 (2.5)	7.7 (2.3)
Total	100%	4.7%	28.2%	30.3%	36.8%	83.0%	17.0%	73.4%	26.6%

The numbers are means and SD unless otherwise stated.

[a]$N = 382$.

[b]$N = 380$.

[c]Data collected only in the subsample reporting chronic pain ($N = 115$).

[d]One participant with missing data ($N = 114$). High health care use was defined as the highest quartile of the distribution for a number of doctor visits (i.e. ≥ 6 doctor visits in the last 12 months).

Table 2. Multivariate regression analysis of the association between chronic pain and number of doctor visits/high health care use in the last 12 months in community-dwelling older adults (*N*=383): the PAINEL study

	Number of doctor visits			High health care use		
	Coefficient[a]	95% CI	*P*	OR[b]	95% CI	*P*
Female sex	0.53	–0.62 to 1.67	0.367	N/A		
Age	N/A			N/A		
Years of education	0.10	–0.00 to 0.21	0.051	N/A		
Living with significant other	N/A			N/A		
BMI	0.05	–0.06 to 0.16	0.345	N/A		
Multimorbidity	**1.69**	**0.48 to 2.89**	**0.006**	**1.93**	**1.13 to 3.30**	**0.017**
Katz index	0.62	–0.47 to 1.72	0.262	N/A		
Depressive symptoms	0.23	–0.06 to 0.52	0.118	1.04	0.91 to 1.19	0.560
Inadequate sleep	N/A			N/A		
Private health insurance	**1.77**	**0.70 to 2.85**	**0.001**	**2.58**	**1.49 to 4.46**	**0.001**
Chronic pain	**1.48**	**0.35 to 2.62**	**0.011**	**2.27**	**1.39 to 3.72**	**0.001**

High health care use was defined as the highest quartile of the distribution for a number of doctor visits (i.e. ≥6 doctor visits in the last 12 months). N/A, variable was not associated with measure of health care use at *P* < 0.1 in univariate analysis. Statistically significant associations are highlighted in bold (*P* < 0.05).

[a]Unstandardized B coefficient for linear regression.

[b]ExpB for logistic regression.

Table 3. Multivariate regression analysis of the association between pain intensity and high health care use in the last 12 months in community-dwelling older adults with chronic pain (*N* = 115): the PAINEL study

	High health care use		
	OR[a]	95% CI	*P*
Female sex	N/A		
Age	N/A		
Years of education	N/A		
Living with significant other	N/A		
BMI	N/A		
Multimorbidity	1.21	0.52–2.81	0.654
Katz index	N/A		
Depressive symptoms	1.03	0.83–1.27	0.805
Inadequate sleep	N/A		
Private health insurance	2.06	0.87–4.88	0.102
Pain intensity	1.12	0.94–1.33	0.204

High health care use was defined as the highest quartile of the distribution for a number of doctor visits (i.e. ≥6 doctor visits in the last 12 months). N/A, variable was not associated with measure of health care use at *P* < 0.1 in univariate analysis.

[a]ExpB for logistic regression.

and hospitalization (OR = 1.07; 95% CI = 0.89–1.28; *P* = 0.498), whereas a significant univariate association was observed for high health care use (OR = 1.13; 95% CI = 1.06–1.20; *P* < 0.001). However, significance was lost when the effects of confounders were considered (Table 3).

Discussion

In community-dwelling older Brazilian adults, chronic pain was found to be positively associated with two of the three measures of health care use investigated. Importantly, these effects were independent of the those of predisposing, enabling and illness-level components from the Andersen Model (27). Our findings of an increased number of doctor visits among chronic pain sufferers are in line with those from studies previously conducted in the general adult population of high-income countries (4–6). For instance, the interpretation of our estimate is remarkably similar to that reported by the largest population-based survey conducted on the topic (4): in both studies, chronic pain (of any severity) was associated with 1.5-fold increases in the number of doctor visits in the last 12 months.

To our knowledge, only one study (22) had previously attempted to provide representative data on the relationship between chronic pain and health care use among Brazilian older adults. Contrary to our finding of an association between chronic pain and high health care use, this relationship was not only non-significant in Dellaroza's study, but it followed an opposite direction to what is indicated by current evidence, i.e. older adults suffering from chronic pain were less likely to report high health care use (22). Such 'unexpected' result could be attributed to the use of an outcome with poor validity, given that the authors defined high health care use as ≥4 doctor visits or at least one hospitalization during the last 12 months. In older populations with an elevated number of comorbidities, this definition probably reflects normative or trivially elevated health care use.

In our study, older adults with and without chronic pain did not differ in the report of at least one hospitalization in the last 12 months. In a previous survey including 1806 Swedish adults, the authors were also unable to demonstrate differences in a similar outcome (at least one hospitalization in the last 3 months) (6). However, findings from recent population-based surveys conducted in countries with different levels of income have suggested a predictive role of chronic pain for the number of hospital admissions, with 1.1 (non-high-income country) (36) to 1.6-fold (high-income country) (4) increases found among individuals with chronic pain. The loss of statistical power in studies using a dichotomous measure of hospitalization (37) and the use of a cut-off with low discriminative performance for the targeted population (e.g. at least one hospital admission) might have contributed to these inconsistent research findings.

Despite previous evidence for a greater likelihood of increased health care use among individuals with more severe pain states (4,6), this was not supported by our data on pain intensity and pain-associated disability. In a population-based survey including nearly 5000 Malaysian older adults, Zaki and Hairi (36) also failed to demonstrate an association between the level of pain interference and the frequency of hospitalization in the last 12 months.

Additionally, the authors found that Malaysians with higher pain interference reported fewer visits to ambulatory care facilities than those with lower levels of pain interference (36). Unique characteristics of health care systems in different countries and ethnic/cultural factors have been regarded as the main reasons for these conflicting results (22,36).

Although participants of the PAINEL study were selected from a population-based probabilistic sample of older inhabitants from a large capital city in Brazil (24), the exclusion of approximately one-third of the original sample might limit our data representativeness to the background population. In a *post-hoc* analysis comparing the distribution of exposure and outcome variables between participants and non-participants, no differences were observed in the number of doctor visits ($P = 0.481$) or hospitalizations ($P = 0.054$); however, we included a higher proportion of women ($P = 0.001$), our sample was younger ($P < 0.001$) and less depressed ($P = 0.032$). In addition to this drawback, further limitations to our analyses include a cross-sectional design that does not permit inferences about causal relations and potential changes in the status of modifiable exposures between the two stages of data collection. Coverage bias might also have affected our estimates given that the main contributor to the decrease in the overall response rate of the musculoskeletal interview was the lack of an active telephone line. Previous data from a large health survey indicated that Brazilians who do not own a residential telephone line have lower economic power and less access to health care services (38).

Our study was the first to replicate the finding of an independent association between chronic pain and health care use in community-dwelling Brazilian older adults. This is highly relevant in the context of Brazil's health care system, as it indicates the necessity of providing high-quality and effective first-line treatment to elders with chronic pain in order to contribute for the sustainability of universal coverage over the long run. Overutilization of health services by individuals with painful musculoskeletal conditions is a known problem in Brazil (39) and worldwide (15). There is a large room for improvement in primary care management of chronic pain by the implementation of best practice recommendations—however, practice guidelines need to be reconsidered due to their focus in a single-morbidity model (40), which fails to account for complex inter-relationships between multiple conditions and reduce the quality of care provided to older adults.

Conclusions

Our study provides timely data to support the negative impact of chronic pain on the Brazilian health system. In less developed countries, increases in health care costs due to chronic pain can be devastating to public health systems that are already strained by a rapid demographic transition. Improving the quality of primary care management of individuals at greater risk of developing chronic pain should be a cornerstone of current health policies directed towards reducing the personal and societal burden of ageing, particularly in low- and middle-income countries.

Declaration

Acknowledgements

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