REHABILITATION SECTION

Original Research Article

A Nationwide Study of Chronic Pain Prevalence in the General Spanish Population: Identifying Clinical Subgroups Through Cluster Analysis

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Abstract

Objective. This study aims to assess the preva-
lence of chronic pain, its characteristics, and its
impact on the general Spanish population. Also,
to establish chronic pain patient subgroups accord-
ing to the characteristics of pain and to identify
variables specifically associated with each sub-
group.

Design. Telephone-based, cross-sectional nation-
wide study.

Subjects. A sample of 1,957 individuals representa-
tive of the Spanish population.

Methods. Data were collected through telephone
interviews. A subject was considered to have
chronic pain if they had suffered pain (at least 4 days
a week) during the last 3 months. The subjects were
divided into two subgroups through a cluster analy-
sis, and a regression model was established to
determine the variables most specifically associ-
ated with these subgroups.

Results. The prevalence of chronic pain was 16.6%
(95% confidence interval: 14.9–18.3) and among
these subjects, more than 50% referred to limita-
tions in their daily activities, 30% felt sad and/or
anxious, and 47.2% indicated that their pain was
affecting their family life. Two subgroups of subjects
with pain were identified: 1) characterized by gener-
alized pain in more than one location and of a long
evolution (150 months); and 2) characterized by pain
localized to only one site with a shorter duration
(100 months). Individuals who felt anxious because
of their pain and those who considered that their
pain was affecting their family were more likely to
belong to group 1.

Conclusions. Pain affects an important proportion
of the Spanish adult population and that it has a
strong personal impact. Two pain groups were
clearly distinguished by their clinical characteristics.

Key Words. Chronic Pain; Prevalence; Cross-
Sectional Study; General Population; Clusters

Introduction

Chronic pain (CP) is currently recognized as a serious public health problem, conveying an important economic and social burden in Europe [1–3]. Moreover, this condition not only has serious consequences for the individuals who suffer from it, but also it affects their social and familial environment [2,4,5]. Studies carried out in different settings have demonstrated that the prevalence of CP is variable, and it can range between 10% and 30% in the adult population, although figures as low as 2% and as high as 50% have also been reported [6]. These differences have been attributed to different causes, such as the specific characteristics of the study population, variability in the study methods used, and the diversity of criteria used to define pain [7]. Despite this variability, it has been demonstrated that it is important to understand the epidemiology of CP in order to establish better health policies and plan for the improved use of health resources [7,8]. For this reason, it is important to make it a priority to obtain valid and reliable information regarding CP in different countries.

In Spain, three epidemiological studies of large samples have been published in the last decade, analyzing the prevalence of CP in the general population [1,9,10]. One of these was carried out more than 10 years ago, showing a prevalence of pain longer than 3 months of 23.4% and being much more common in women (31.4%) than in men (14.8%) and in people older than 65 years (39.5%) than younger people (8.5%) [9]. The other two studies [1,10] are more recent, and they showed a prevalence ranging from 12% to 17.2%. However, the validity of the information reported in these studies has been brought into question due to the inadequate description of the study setting, study participants, eligibility criteria, statistical methods, and results as confounder unadjusted or adjusted [6].

The limited information on CP available in Spain, and the need to identify the real magnitude of CP considering all ill types and not limited to a specific diagnosis, and the factors associated with it, prompted us to perform this study. Accordingly, we established the following objectives: 1) to estimate the prevalence of CP in the general adult Spanish population, defining CP as pain (at least 4 days a week) for more than 3 months in accordance with International Association for the Study of Pain (IASP) criteria [11]; 2) to describe the characteristics of CP, the associated limitations, and its impact on the emotional status and work activity of sufferers; 3) to establish CP patient subgroups according to the characteristics of the pain experienced; and 4) to identify sociodemographic, clinical, and social variables associated to each pain subgroup.

The classification of patients into subgroups using cluster analysis is a particularly noteworthy aspect of this study. Such classification has previously been achieved in other countries for several CP conditions, such as fibromyalgia and lower back pain, successfully demonstrating its clinical utility [12,13]. However, it has not yet been performed in Spain, neither for patients suffering specific CP conditions nor for individuals suffering CP in the general population.

Methods

A nationwide epidemiological cross-sectional study was carried out on a representative sample of the general Spanish population, although the available population included individuals in households with a landline telephone. The population targeted was Spanish individuals ≥18 years old who resided at the address selected, who accepted to participate in the study, and who were able to complete the questionnaire. On the other hand, the exclusion criteria were, age <18 years old, a nationality other than Spanish, not residing at the selected address, no landline telephone in the house, or the incapacity to respond to the questionnaire.

Sampling Method

A multistage stratified sampling was used in the study, carrying out participant selection in four stages.

In the first sampling phase, strata were constructed according to the classification of the whole Spanish territory into four areas on the basis of population aging criteria, derived from the ratio between the population older than 65 years of age and those younger than 15. The "aging" criterion was considered together with that of "geographical area," given that both these factors have previously been demonstrated to influence pain prevalence [14,15].

During the second sampling phase, the number of towns within each stratum was determined, classifying the towns into four groups according to their size (<5,000; 5,000–20,000; 20,000–50,000; >50,000). Subsequently, a number of towns were selected at random, proportional to the total number in the group.

In the third phase, sampling units (telephone numbers) were selected at random from each town chosen, using the list of telephone numbers included in the Infobel España Office v.7.1 directory (Kapitol s.a. Uccle, Bruselas). In this way, our target population represented approximately 90% of Spanish homes with a landline supplied by any telephone company, which in turn represented 80.6% of all Spanish homes. Therefore, the final percentage of the eligible Spanish population accessed was 72.5%.

In a fourth sampling phase, the subjects interviewed from their homes were selected randomly according to the previously established sex and age quotas. As a criterion for the choice of a respondent within the home, it was established that the first individual answering the phone was always chosen as long as they belonged to one of the strata of the population considered in the study and provided that this stratum was not already completed. If the person answering the phone did not fulfill this condition,

another resident was chosen according to a previously fixed sequence, giving priority to the most difficult groups to achieve:

• First: Male aged 18–44.
• Second: Female aged 18–44.
• Third: Male aged ≥ 65.
• Fourth: Female aged ≥ 65.
• Fifth: Male aged 45–64.
• Sixth: Female aged 45–64.

If the person chosen was unavailable at that time, we asked them to arrange the interview for another more suitable moment.

Before the interview, all subjects included in the study gave their informed consent. Three attempts were made to contact a home number before it was dismissed, calling at different times of the day. If no contact was established, the phone number was substituted by another in the same group.

Sample Size

The sample size was determined based on previous reports of the overall prevalence of CP and on its prevalence by sex and age [1,9]. Thus, if we consider the lower overall prevalence of 12% (95% confidence interval [CI] and error = 2) found in Spain, a sex odds ratio (OR) = 2.6 with a male/female ratio of 1, and an age OR = 1.5 with a 45–64/>65 years old ratio of 2, in both cases with a 95% CI and a relative precision of 20%, the final sample size needed was of 1,930 subjects. However, if the response rate of 42% from other telephone interview based studies was taken into account [16,17], the estimated final number of sampling units should be 4,595.

Data Collection and Instruments

From February to June 2011, the data were collected between 4 and 8 PM from Monday to Friday by trained interviewers (nurses, physiotherapists, and physicians), who received a 10-hour workshop in which they were informed about the purpose of the study, the protocol of work and even a simulation of the data collection was carried out in the platform Limesurvey™ (Hamburg, Germany). A member of the research team was designated as the coordinator and supervised the data collection daily, attending to any problems encountered during the process. The information was gathered via structured computer-assisted telephone interviews (CATIs) using the Skype™ platform (Skype Communications S.A.R.L. 23-29 Rives de Clausen, Luxemburgo) based on some questions from other surveys, such as the "Spanish National Health Survey 2006" and the "Spanish Survey on Disability, Personal Autonomy and Dependency 2008," conducted by the Spanish National Statistics Institute [18,19].

It was considered that the survey should not take more than 15–17 minutes and should include general aspects, easy to answer by patients. A total of 32 questions were included.

The survey was divided into two blocks. The first one was aimed at individual selection and collection of sociodemographic data of the respondent and the household, as well as determining the prevalence of pain in the population and households. One screening question was used to identify the subject with pain and, accordingly, a subject was considered to be in pain if they had suffered pain on at least 4 days a week during the last month. Moreover, the patient was considered to have CP if they had suffered pain (at least 4 days a week) during the last 3 months, in accordance with the IASP definition [11].

If the subject claimed to be in CP, the second block of the survey was administered, where they were asked about the intensity and duration of pain, as well as about the number (one site/more than one site) and localization of painful areas (head, neck, back, limbs and/or joints, chest, abdomen, and generalized pain, defined as a pain affecting the whole body). Pain intensity was measured in an ordinate scale that contemplated four categories: "mild," "moderate," "severe," and "unbearable pain" [20]. Information was also gathered on how pain limited the subject's daily activities (getting up or sitting down, washing and bathing, dressing, doing housework, walking outside at normal pace for at least 15 minutes, going up or down a flight of stairs, bending or kneeling down, squatting, lifting weight, performance of physical activities, getting about using public transport, work activities outside of home, sexual relations, and sleep), categorizing the answers as: "not at all," "a little," "moderate," "quite a lot," and "a lot." It was also recorded if the patients were taking any medication to pain relief, categorizing the answers as "yes" and "no."

Two questions were included regarding sadness and anxiety feelings caused by their pain, categorizing the answers as: "not at all," "a little," "moderate," "quite a lot," and "a lot." Similarly, another two questions were included to determine the impact of pain on the subject's employment, including whether the subject had required sick leave, or if they had left or lost their job during the last year due to pain (these questions were only addressed to those subjects under 65 years of age), categorizing the answers as "yes" and "no." Finally, a question was included to define the individuals' perception of the impact of their pain on the family environment, categorized as: "not at all," "a little," "moderate," "quite a lot," and "a lot."

When an individual's pain was present at more than one location, their responses referred to the site at which the pain was most intense at the time of the interview.

It is worth mentioning that during the first week of the study, a pilot test was conducted to identify potential issues and solve them and that the information was directly collected on the Limesurvey™ platform.

This study was conducted in agreement with the Bioethics Committee at the University of Cádiz.

Statistical Analysis

A descriptive analysis of the variables studied was performed, calculating the frequency, central tendency, and dispersion. The prevalence of pain that had lasted for at least 1 month (± 95% CI), the prevalence of CP and the prevalence of CP per household, were calculated.

In order to define the associations between the variables studied, a Student's *t*-test or analysis of variance was performed for quantitative variables, and χ^2 tests were used to assess the qualitative variables. For variables with ordinate values or those where the Kolmogorov–Smirnov test demonstrated a non-normal distribution, the Mann–Whitney *U*-test or Kruskal–Wallis H tests were used. For all the tests, $P \leq 0.05$ was considered significant.

Using a cluster analysis, the individuals with CP were classified into groups established according to the duration, intensity, topography, and number of painful sites. A hierarchical method was used for this analysis based on Gower's norm, a measure of similarity that allows quantitative, qualitative, and dichotomized variables to be used simultaneously in the analysis [21]. Following the formation of clusters, χ^2 and Mann–Whitney *U*-tests were used to confirm that each variable used in the analysis was differentiated by the cluster solution. Subsequently, a stepwise backward regression model was constructed to determine the factors associated with the pain groups previously identified, where the dependent variable was the pain groups and the independent variables included in the model were: sex, age, academic level, taking pain relief medication, limitation of daily activities, sadness, or anxiety feelings (grouped as "no" vs "yes": where "yes" includes "a little," "moderate," "quite a lot," and "a lot"), the impact of pain at work (sick leave or loss of employment), and the impact of pain on the family environment (grouped

as "not affected" vs "affected": where affected includes "a little," "moderate," "quite a lot," and "a lot"). The criteria used for selecting the covariables included in the models were clinical and statistical (significance observed in the bivariate analysis, $P < 0.05$: data not shown).

These analyses were all carried out with the IBM SPSS Statistics 19 (IBM Corporation, NY, USA) and R version 2.7.2 (the R project, Auckland, Nova Zelândia) statistical tools.

Results

During the study period, 5,348 telephone calls were made to selected households, and 1,976 effective interviews were finally considered, with a response rate of 36.9%. The causes for nonresponse were the nonacceptance to participate in the study and the fact that the subject belonged to a stratum already completed.

After refining the data to rule out cases with incoherent data, 1,957 valid cases were finally studied. In terms of the sex and age distribution, the population surveyed was similar to that of the general Spanish population [22], and the absence of important differences ensured that the sample studied was representative of the total population (Table 1).

Pain Prevalence

In the 1957 surveyed, the prevalence of pain in the last month (N = 390) was 19.9% (95% CI: 18.1; 21.7) and that of CP (N = 325) was 16.6% (95% CI: 14.9; 18.3), with a higher prevalence in women and in older subjects of either sex ($P < 0.001$: Figure 1). The prevalence of CP per household was 24.4% (95% CI: 22.4; 26.3), indicating that in one out of four homes a family member suffered from CP.

Table 1 Distribution of the study sample and the general Spanish population in function of sex and age

|	Sample N (%)	General Spanish Population N (%)	P Value*
Total	1,957	33.876.449	
Sex			
Male	971 (49.62)	16,4123,88 (48.45)	0.301
Female	986 (50.38)	17,464,061 (51.55)	
Age group			
18–44	943 (48.19)	15,870.041 (46.85)	0.431
45–64	600 (30.66)	10.506,434 (31.01)	
65 or more	414 (21.15)	7,499,974 (22.14)	
Sex and age			
Male 18–44	497 (25.40)	8,066,250 (23.81)	0.661
Male 45–64	295 (15.07)	5,185,368 (15.31)	
Male 65 or more	179 (9.15)	3,160,770 (9.33)	
Female 18–44	446 (22.79)	7,803,791 (9.33)	
Female 45–64	305 (15.59)	5,321,066 (15.71)	
Female 65 or more	235 (12.01)	4,339,204 (12.81)	

* χ^2 test.
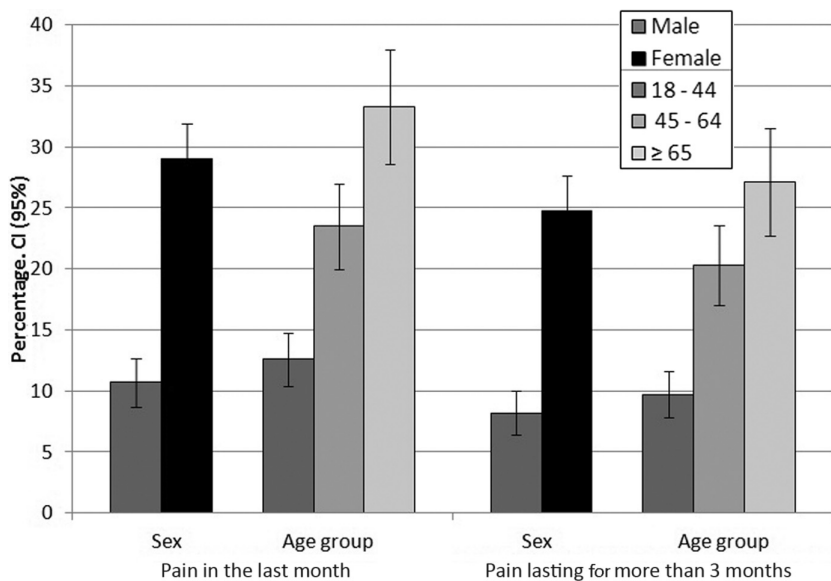
Figure 1 Pain prevalence by sex and age group.

Characteristics and Impact of Pain

Out of the 325 subjects suffering CP, 75.4% were women, and the mean age was of 56.5 years (standard deviation [SD]: 15.2), the majority of whom had completed primary or secondary education (Table 2). The mean duration of pain was approximately 10 years, and 43.4% of individuals reported having moderate pain intensity while 35% endorsed severe pain, despite the fact that 69.2% of the subjects were taking medication to pain relief. Pain was present at more than one location in 45.4%, with the most frequent sites being the limbs and/or joints (Table 2).

When the emotional and work-related impact of pain was considered, 32.2% of those interviewed felt sad or very sad and 29.3% anxious or very anxious. In addition, almost 25% had been on sick leave at least once in the last year and 12% had left or lost their job because of pain during that period (Table 2). Between 50% and 64% of the subjects indicated that pain had a considerable effect on their daily activities, most frequently having an impact on lifting weight, physical activities, bending, kneeling, crouching, and going up or down a flight of steps (Figure 2). In 31.8% of subjects, sleep was affected "quite a lot" or "a lot" by their pain, and one out of four had significant or severe problems getting up or sitting down. Other basic activities such as washing, bathing, or combing one's hair were also affected by pain, although to a lesser extent (Figure 2). Likewise, 47.2% individuals indicated that their pain affected their family (Table 2).

Characteristics and Impact of Pain in Function of Sex, Age, and Academic Achievement

With regard to sex differences in the study population, we found a higher percentage of women than men with more than one painful site (Table 3), and although men reported the back as the most frequent site for pain, women's pain was more frequently localized in the limbs and/or joints. In addition, a higher proportion of women (16% vs 7.6%) considered their pain to be "unbearable," and a higher proportion described a strong feeling of sadness and anxiety in relation to their pain (Table 3). Nevertheless, no differences were found by sex regarding the daily activities (data not shown), the work-related consequences or the impact of pain on the family (Table 3).

When the results were analyzed according to age, a higher proportion of generalized, joint and/or limb pain was found among older interviewees; however, no differences were observed in the intensity or the number of painful sites (Table 3). Individuals aged 65 years old or more had greater difficulty than younger people in carrying out activities involving movement or effort, although the only statistically significant limitation was going up or down a flight of stairs, these limitations increased with age ($P = 0.006$: data not shown).

With regard to academic achievement, those with a poorer education took less sick leave than subjects with a higher academic achievement (Table 3). However, individuals with a higher academic level generally referred to being less limited than those with lower educational qualifications (data not shown).

No differences in the consumption of pain relief medication were observed by sex, age, or educational level in the subjects (Table 3).

Subgroups of Subjects with Pain and Factors Associated

To identify patient groups, specific characteristics of pain were analyzed (duration, intensity, location, and number of sites). Having excluded pain intensity from this analysis, as it was not a classification variable, two patient groups

Table 2 Characteristics and impact of pain in the study sample with chronic pain (N = 325)

Variable		%
Characteristics of the study sample with chronic pain		
Sex	Male	24.6
	Female	75.4
Age	*Mean (SD)*	*56.5 (15.2)*
	Median (Q1; Q3)	*58 (44; 68)*
Academic achievement	No education	19.2
	Primary education	26.4
	Secondary education	25.5
	Vocational training	12.6
	University	16.3
Characteristics of pain		
Pain duration (years)	*Media (SD)*	*10.3 (11.3)*
	Median (Q1; Q3)	*2 (2; 15)*
Number of pain sites	1 site	54.6
	More than 1 site*	45.4
Pain intensity perception	Mild	7.7
	Moderate	43.4
	Severe	35
	Unbearable	13.9
Pain localization	Generalized pain	18.6
	Head	9.6
	Neck	6.5
	Back	23.5
	Limbs and/or joints	35.9
	Chest	1.6
	Abdomen	2.8
	Other	1.5
Pain relief medication	Yes	69.2
Impact of pain		
Do you feel sad because of your pain?	Not at all	28.7
	A little	17.9
	Moderate	23.2
	Quite a lot	18.2
	A lot	12
Do you feel anxiety or distress because of your pain?	Not at all	31.5
	A little	18.8
	Moderate	20.4
	Quite a lot	17.9
	A lot	11.4
Have you been on sick leave because of your pain in the last year?		24.4
Have you had to leave your work or have you lost your job because of pain in the last year?		12
How do you consider your pain affects your family?	Not at all	52.8
	A little	12.6
	Moderate	16.4
	Quite a lot	14.8
	A lot	3.4

* In case of presenting more than one location, the other variables referred to that most affected.

were obtained by the cluster analysis. Group 1, referred to as type I or worse pain, was associated with the worst characteristics. It included 148 subjects with a mean age of 58 years (SD: 13.7), 79.7% of whom were women, 29.4% with only primary education (19.6% secondary education) and with the characteristic presentation of pain at more than one site and generalized pain of long evolu-

tion (150 months: Table 4). Group 2, type II or better pain, was similar in size to group 1 (177 subjects), with 71.8% women of a mean age of 55 years (SD: 16.3), and 30.3% of the subjects had completed secondary education (24% primary education). This group was characterized by pain localized to only one site, mainly in the back or head and of a shorter duration (100 months: Table 4).
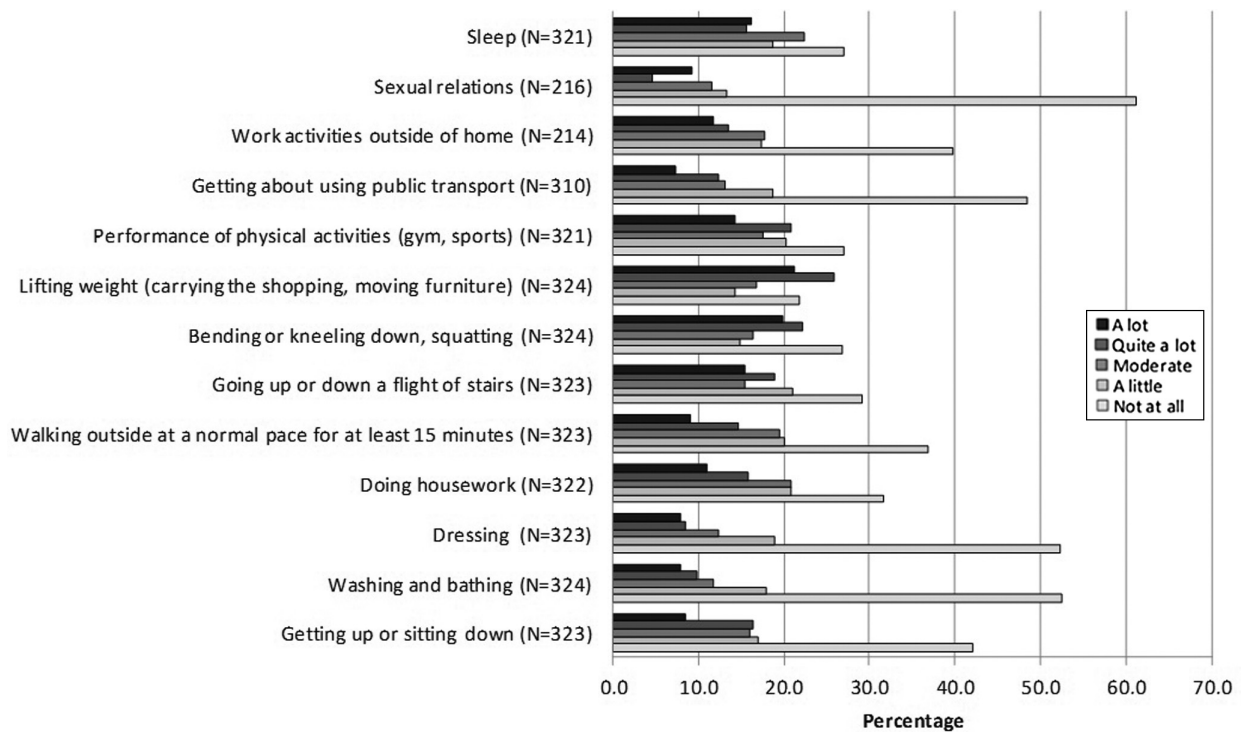
Figure 2 Limitations on daily activities associated with pain.

When the factors associated with these two groups of subjects were analyzed, those individuals who felt anxious about their pain (OR = 1.698), and those who reported that their pain was affecting their family (OR = 2.576) were more likely to belong to the type I pain group (Table 5).

Discussion

The present study analyzed the prevalence of CP and its impact in the general Spanish adult population. In addition, a subgroup analysis of CP was carried out for the first time in Spain, which demonstrated how anxiety feelings and the concern that pain is affecting the family are factors associated with CP with more severe characteristics.

This study was carried out on a large sample using a rigorous selection procedure and a standardized definition of pain, guaranteeing that the results are representative. As such, we consider that the information provided is likely to be valuable. It is noteworthy that the results of the survey show CP to be a frequent problem that affects individuals over a prolonged period of time. We identified a higher prevalence of CP than that published in some studies [1,9], yet quite similar to that reported in others [7,10]. There was a higher prevalence in women and in older subjects, as seen elsewhere [9,15,23,24], although this contrasts with the higher prevalence of pain found in the 40–59 age group in one study [10]. However, this latter study did not focus on CP, which may have led to the inclusion of more acute painful processes that more commonly affect a younger population.

As in other studies carried out in Spain [10] and in other countries [7,25], we found that women reported more severe and persistent pain in our population, with a greater body area affected than in men, although the role of gender in human pain perception is still unclear. Indeed, in a review of pain related to gender, substantial differences in clinical and experimental pain responses were reported, and the potential underlying mechanisms discussed included gonadal hormones, endogenous pain modulatory systems, gender roles, and cognitive/affective factors [26]. Moreover, in a recently published systematic review [27], it was suggested that pain sensitivity in healthy males and females could be influenced distinctly by certain biopsychosocial factors, although more studies must be carried out to better understand the factors and mechanisms that might explain these differences.

Other important factors analyzed in the study were the physical limitations caused by pain, as well as the emotional and work-related impact. Regarding the physical aspects, our results are in agreement both with those obtained some years ago in the Spanish population [9] and those obtained more recently by Breivik et al. [1], even though the effects of pain on sleep found in the latter were more frequent (56%) than we observed. However, the information provided by Breivik corresponds to the effect of pain on sleep in the set of all countries included in the study, not reporting the specific data for Spain. The impact of CP on work has been analyzed in different studies [1,7,24,28] who found in more than 40% of cases, pain interferes with an individual's work, provoking an increase

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Table 3 Characteristics and impact of pain in the study sample with chronic pain according to the gender, age group, and academic level of the subject (%)

Variable	Sex			Age Group				Academic Level					
	M	F	P	18–44	45–64	≥65	P	NE	PE	SE	VT	UE	P
Pain Characteristics													
Pain duration (years)			0.064*				0.051‡						0.208‡
Media (SD)	8.9(10.9)	10.7(11.4)		8.6(9.2)	9.3(9.6)	12.7(13.8)		12.9(13.3)	9.8(11.4)	8.9(10)	9.7(10.7)	9.8(10.5)	
Number of pain sites	N = 80	N = 244	0.016†	N = 91	N = 121	N = 112	0.485†	N = 60	N = 84	N = 81	N = 40	N = 52	0.300†
1 site	66.3	50.8		59.3	54.5	50.9		51.7	50	65.4	55	51.9	
More than 1 site	33.7	49.2		40.7	45.5	49.1		48.3	50	34.6	45	48.1	
Pain intensity perception	N = 79	N = 244	0.173*	N = 91	N = 120	N = 112	0.368‡	N = 60	N = 84	N = 80	N = 40	N = 52	0.663‡
Mild	12.7	6.1		3.2	6.7	12.5		5	9.5	5	10	11.5	
Moderate	40.5	44.3		45.1	44.2	41.1		43.3	35.8	45	47.5	46.2	
Severe	39.2	33.6		35.2	35.8	33.9		36.7	44	31.3	30	28.8	
Unbearable	7.6	16		16.5	13.3	12.5		15	10.7	18.7	12.5	13.5	
Pain localization	N = 80	N = 243	0.026†	N = 91	N = 121	N = 111	0.046†	N = 60	N = 84	N = 84	N = 40	N = 52	0.608†
Generalized pain	15	19.8		15.4	16.5	23.4		21.7	16.7	18.7	17.5	17.3	
Head	7.5	10.3		16.5	8.3	5.4		3.3	7.1	16.3	7.5	9.6	
Neck	5	7		8.8	7.4	3.6		5	3.6	8.8	7.5	9.6	
Back	35	19.8		19.8	25.6	24.3		20	23.8	28.7	30	17.3	
Limbs and/or joints	28.8	38.3		30.7	34.7	41.5		45	40.4	22.4	35	38.6	
Chest	0.9	0.8		1.1	2.5	0.9		3.3	1.2	1.3	0	1.9	
Abdomen	5	2.1		3.3	4.1	0.9		1.7	4.8	2.5	0	3.8	
Other	0	2.1		4.4	0.9	0		0	2.4	1.3	2.5	1.9	
Pain relief medication	N = 80	N = 245	0.345†	N = 91	N = 122	N = 112	0.724†	N = 61	N = 84	N = 81	N = 40	N = 52	0.620†
	65	70.6		65.9	70.5	70.5		77	70.2	69.1	67.5	63.5	
Impact of pain on the patient	M	F	P	18–44	45–64	≥65	P	NE	PE	SE	VT	UE	P
Do you feel sad because of your pain?	N = 80	N = 244	0.188*	N = 91	N = 122	N = 111	0.692‡	N = 60	N = 84	N = 81	N = 40	N = 52	0.690‡
Not at all	35	26.6		36.3	23.8	27.9		18.3	32.2	33.4	22.5	34.6	
A little	18.7	17.6		14.3	19.7	18.9		20	17.9	12.3	20	21.2	
Moderate	15	25.8		15.4	30.3	21.7		28.4	20.2	24.7	27.5	15.4	
Quite a lot	25	16.1		24.2	13.1	18.9		20	19	18.5	12.5	17.3	
A lot	6.3	13.9		9.8	13.1	12.6		13.3	10.7	11.1	17.5	11.5	
Do you feel anxiety or distress because of your pain?	N = 80	N = 244	0.235*	N = 91	N = 121	N = 112	0.400‡	N = 61	N = 84	N = 81	N = 40	N = 51	0.308‡
Not at all	37.5	29.5		35.2	26.4	33.9		26.2	34.6	35.8	15	39.3	
A little	16.2	19.7		18.7	19.8	17.9		14.8	19	16	27.5	17.6	
Moderate	17.5	21.3		15.3	22.3	22.3		32.8	19	17.3	22.5	13.7	
Quite a lot	23.8	16		18.7	18.2	17		18	15.5	19.8	17.5	17.6	
A lot	5	13.5		12.1	13.3	8.9		8.2	11.9	11.1	17.5	11.8	
Have you been on sick leave because of your pain in the last year?	N = 77	N = 231	0.107†	N = 90	N = 116	—	0.276†	N = 56	N = 78	N = 76	N = 39	N = 52	<0.001†
	31.2	22.1		35.6	28.4	—		3.6	19.2	25	43.6	38.5	
Have you had to leave your work or have you lost your job because of pain in the last year?	N = 77	N = 231	0.266†	N = 90	N = 117	—	0.735†	N = 57	N = 77	N = 77	N = 39	N = 51	0.368†
	15.6	10.8		14.4	12.8	—		5.3	14.3	11.7	12.8	17.6	
How do you consider your pain affects your family?	N = 80	N = 244	0.117*	N = 91	N = 121	N = 112	0.632‡	N = 60	N = 84	N = 81	N = 40	N = 52	0.267‡
Not at all	62.5	49.6		59.3	47.1	53.6		43.3	54.8	54.3	55.0	59.6	
A little	7.5	14.3		6.6	17.3	12.5		13.3	11.9	7.4	20.0	13.5	
Moderate	12.5	17.6		15.4	20.7	12.5		21.7	14.3	18.5	12.5	13.5	
Quite a lot	15.0	14.8		14.3	11.6	18.8		16.7	11.9	19.8	10.0	11.5	
A lot	2.5	3.7		4.4	3.3	2.6		5.0	7.1	0	2.5	1.9	

* Mann–Whitney U test; † χ^2 test;
‡ Kruskal–Wallis H test; P = P value; NE = No studies; PE = Primary Studies; SE = Secondary Studies; VT = Vocational Training; UE = University Education.
F = Female; M = Male.

Table 4 Pain subgroup characteristics

Variable	Type I Pain N = 148	Type II Pain N = 177	P Value
Pain duration (months)			<0.001*
Media (SD)	*150.5 (131.4)*	*100.4 (134.0)*	
Median (Q1; Q3)	*49.5 (120; 201)*	*16.5; 48; 120*	
Number of pain sites	N (%)	N (%)	<0.001†
1 site	3 (2.0)	174 (98.3)	
More than 1 site	144 (98.0)	3 (1.7)	
Most frequent pain localization	**n (%)**	**n (%)**	<0.001†
Generalized pain	52 (35.1)	8 (4.6)	
Head	6 (4.1)	25 (14.3)	
Neck	8 (5.4)	13 (7.4)	
Back	25 (16.8)	51 (29.1)	
Limbs and/or joints	55 (37.2)	61 (34.9)	
Chest	1 (0.7)	4 (2.3)	
Abdomen	0 (0.0)	9 (5.1)	
Other	1 (0.7)	4 (2.3)	

* Mann–Whitney *U*-Test; † χ^2 test.
SD = Standard deviation; Q1 = 1st quartile; Q3 = 3rd quartile.

in sick leave and restricting professional development. Although somewhat milder, our results are consistent with those referred to elsewhere [7,28].

The relationship between CP and mood disorders observed here has been the focus of research studies in recent years, demonstrating how the coexistence of pain and depression produces a greater impact on the patient than either disorder alone [29–31]. Indeed, it has been shown that both processes can trigger and perpetuate one another, due to overlapping neurobiological mechanism and neuroanatomical substrates [32].

Comorbid depression in pain patients contributes significantly to poorer outcomes and increased treatment costs, highlighting the need to better understand the relationship between these two conditions. On the other hand, anxiety has also been shown to be experienced frequently by patients with CP [1,7,33], and it has been shown to be a factor that conditions the presence of pain [34]. Indeed, pain, anxiety, and depression are frequently associated, and chronic or multiple pain is more likely to occur when they coexist than when pain is only associated with anxiety or depression alone [34,35].

Table 5 Factors associated with the worst pain group (N = 322)

Variable	Wald Statistic	OR	95% CI	P Value
Constant	19.626	0.368		<0.001
Do you feel anxiety or distress because of your pain?				0.051
No*				
Yes	3.799	1.698	(0.99; 2.89)	
Do you consider your pain affects your family?				< 0.001
No*				
Yes	14.753	2.589	(1.59; 4.17)	

Stepwise backward regression logistic model.
Hosmer–Lemeshow: $\chi^2 = 0.016$; gl = 2; *P* value = 0.992.
Dependent variable: Pain group (Type I vs Type II*).
Type I: generalized pain, in more than one site and of long duration (mean 150 months).
Type II: pain localized to only one site, mainly in the back and head, and of shorter duration (mean 100 months).
Independent variables: sex, age, academic level, pain relief medication, limitation of daily activities, sadness or anxiety feelings, the impact of pain at work (sick leave or loss of employment), and the impact of pain on the family environment.
*Reference category.
OR = odds ratio; CI = confidence interval.

An interesting aspect of our study was the identification of two groups of patients based on the characteristics of pain and the likelihood of feeling anxious and reporting a stronger impact of pain on the family in the group experiencing worse pain. Other studies [12,36] using a similar cluster analysis in patients with fibromyalgia or with low back pain demonstrated their clinical utility to established subgroups of the patients in function of the painful experience, and some pain-related psychosocial factors. However, as far as we know, this is the first time this analysis has been performed on the Spanish population suffering CP.

Similarly, the relevance of the family environment in CP management has been described previously, demonstrating that problems associated with pain extend beyond the individual and have profound consequences for the social networks that involve family, friends, and work colleagues. Furthermore, these consequences are reciprocal and interconnected [37]. Indeed, patients who describe their relatives as supportive report significantly less intense pain, less drug dependence, or higher levels of daily activity than those who consider they have no family support [38].

Finally, we must consider some limitations of the present study, one of which is the questionable nature of the information collected through telephone interviews. However, it has been confirmed that in terms of health issues, telephone interviews produce comparable results with those obtained in face-to-face interviews while allowing access to a larger number of subjects [39]. In addition, taking into account that our telephone directory coverage provided access to 80.6% of all Spanish households and 72.5% of the eligible Spanish population, the selection bias the present study could have incurred is small.

The low response rate observed in this study (36.9%) is another important aspect as it could have introduced a selection bias. However, we believe it does not affect the validity of results as the sample distribution is identical to that of the target population, thereby ensuring that the replies are representative. Likewise, although authors such as Azevedo et al. find a higher response rate (76%) [7], some other studies in Spain [9] and Norway [40] observed similar rates to ours (42% and 48.5%, respectively).

Another potential bias to be considered is that which may be introduced by the interviewer. In anticipation of this bias, the interviewers who collected the information were trained accordingly, providing them with a roadmap and guidelines to follow during the data collection process. Each interviewer registered any incidences that occurred during the day in a notebook, which was checked daily by the coordinator in order to find solutions to these problems.

It should be emphasized that the origin of pain, the specific treatment taken for pain relief, and occupational status were not analyzed in this study. Although this infor-

mation might have been of interest, we did not consider it would be possible to collect such information accurately through a telephone survey. In addition, it would have been impossible for us to contrast the information obtained on the origin of pain and the specific treatment consumed by subjects with an independent and reliable source. This led us to focus on other aspects, such as those related to the impact of pain on the family, rather than the cause of pain, treatments, and occupational status.

It should also be noted that information about other pain-related comorbidities that could affect the participants' responses was not collected. However, all the information collected referred to the pain that most affected the subject and as such, we believe that the effect of other processes that might cause pain would be milder.

Another potential limitation of the study was that mood variables (anxiety and sadness) were assessed by self-reporting, rather than using available depression and anxiety scales. However, we considered it inappropriate to use such scales so as to avoid extending the interview. Indeed, the complete questionnaire was designed based on information from other studies [41,42] and from national surveys carried out in Spain by the National Statistics Institute [18,19], which we believe makes the information obtained more valid and reliable.

Finally, it must be borne in mind that this is a cross-sectional study and thus, the relationships observed between the factors studied in the logistic regression model cannot be considered casual relationships.

In conclusion, this study showed a high prevalence of CP in the Spanish adult population, pain that produces important limitations in patient's daily activities and that affects their emotional and working lives. The study also identified two pain groups with clear differences in their characteristics, the group in which pain was related with anxiety and in which there was a perception that pain affected their family representing those that suffer worse pain. These differences suggest the need to adapt pain management therapeutic strategies to each specific situation, recommending the assessment of anxiety and including the family in multifactorial pain management.

Acknowledgment

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