ORIGINAL ARTICLE

Prevalence of musculoskeletal disorders and rheumatic diseases in an urban community in Monagas State, Venezuela: a COPCORD study

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Abstract The aim of the study was to determine the prevalence of musculoskeletal disorders and rheumatic diseases in an urban community in Venezuela. We conducted a cross-sectional, community-based study using the COPCORD (Community Oriented Program for Control of Rheumatic Diseases) methodology in subjects older than 18 years. Positive cases were evaluated by rheumatologists. We surveyed 3,973 individuals (1,606 males and 2,367 females), with a mean age of 43.7 years (standard deviation (SD) 17.6). Mean duration of education was 8.9 years (SD 3.7), 79.2 % had a monthly income of <US$569, and 46.4 % were working. Excluding trauma, the prevalence of pain in the 7 days prior to interview was 19.9 % (95 % confidence interval (CI) 18.7–21.2 %). Mean pain intensity on a visual analog scale was 6.3 (SD 2.2), and 30.1 % (95 % CI 28.7–31.6 %) had a history of pain. Respondents reported pain in the knees, back, hands, shoulders, and ankles in the last 7 days; 4.7 % described current functional limitation, with 16.5 % reporting limitations in the past. Regarding treatment, 23.9 % received medication, 6.4 % received physical therapy, and 2.6 % received alternative treatment. The main diagnoses were osteoarthritis in 15.0 % (95 % CI 13.9–16.1 %), rheumatic regional pain syndromes in 6.3 % (95 % CI 5.5–7.1 %), back pain in 2.8 % (95 % CI 2.3–3.4 %), rheumatoid arthritis in 0.4 % (95 % CI 0.2–0.6 %), crystal arthropathy in 0.3 % (95 % CI 0.1–0.5 %), fibromyalgia in 0.2 % (95 % CI 0.1–0.4 %), and systemic lupus erythematosus in 0.07 % (95 % CI 0.01–0.2 %). The prevalence of musculoskeletal disorders was 22.4 %, and the most prevalent disease was osteoarthritis. Pain, in which a patient is receiving treatment for musculoskeletal disorders, and physical disability were associated with the presence of a rheumatic disease.

Keywords Community · COPCORD · Prevalence · Rheumatic disease · Venezuela

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Introduction

Rheumatic diseases make up a heterogeneous group of chronic conditions that are the most prevalent and disabling in clinical practice [1, 2]. These pathologies are characterized by musculoskeletal (MSK) pain, stiffness, reduced mobility, swelling, and impaired quality of life. Additionally, they can impose a high socioeconomic burden on individuals and families [3].

In developed countries, the prevalence of rheumatic diseases and MSK pain ranges between 14 and 36 % [4–7]. Numerous studies have been conducted to measure the impact of rheumatic diseases and to implement strategies aimed at identifying patients in the community in the early stages of rheumatic disease to refer them for appropriate health care [8, 9]. The prevalence of MSK pain in Latin American countries ranges between 23 and 46.5 % [10]. However, these diseases often remain a low priority for public health policies [11].

The COPCORD (Community Oriented Program for Control of Rheumatic Diseases) model was introduced in 1981 by

the International League of Associations for Rheumatology in response to the World Health Organization calling for an increase in research into the causes and consequences of chronic diseases, particularly in underdeveloped countries. The model has been proven to be highly useful for the prevention and control of rheumatic diseases and involves multistakeholder efforts in rural, urban, and marginalized urban communities [12].

The COPCORD model uses a simple diagnostic questionnaire that has been validated and administered in 22 countries across Latin America (in Mexico [13, 14], Chile [15], Brazil [16], Cuba [17, 18], Peru [19], and Guatemala [20]). Studies based on the COPCORD methodology have shown variations in the prevalence of some rheumatic diseases in these countries. These variations have been associated with social stress, ethnicity, genetic characteristics, and geographical area [14].

There have been no comprehensive studies on the prevalence of rheumatic diseases in Venezuela [21]. The purpose of this study was to determine the prevalence of MSK disorders and rheumatic diseases in an urban community in the state of Monagas, Venezuela, using the COPCORD methodology.

Methods

Participants

We performed a cross-sectional community-based study from January to December 2011, using the Mexican COPCORD questionnaire validated for Venezuela.

Sampling design

A sample size calculation was made based on a pilot study, considering a 50 % prevalence of MSK complaints with a 3 % uncertainty level and a 95 % confidence level, with 80 % power to discriminate up to 5 % differences in prevalence. In each participating site, a pilot study with 100 subjects was performed to adjust the sample size to calculate the participation rate and the validity of the survey. A census was conducted by the health clinic as part of a health program for vulnerable populations in 1,237 homes in a calculated sample of 3,972 adults older than 18 years from the community of Las Cocuizas in the state of Monagas, Venezuela.

Monagas has a resident population of 905,443 (as of 2011) and lies in the northeastern part of the country. It has an annual economic growth rate of 2.4 %, and the human development index is 0.802, which is the fourth highest in the country and the highest in the eastern part of Venezuela. The Cocuizas community is one of the five civil parishes (administrative divisions of the state) of Maturín, the capital of Monagas. Its comprehensive network of community health-care centers made it feasible to conduct an epidemiological study based

on the COPCORD methodology. The network comprises the following sections: (1) community primary care clinics, (2) comprehensive diagnostic centers for laboratory tests and radiological investigations, and (3) comprehensive rehabilitation centers. The medical teams were keen and eager to participate in the study, and there was support from the local community. The municipality of Maturín is the capital of Monagas and includes the parish of Las Cocuizas (110,976 inhabitants), in which the current study was conducted [22].

Ethical approval for the study was obtained from the research and ethics committees of the local hospital. All study participants signed a letter of informed consent.

Screening questionnaire

The COPCORD instrument allows studies to be conducted by determination of pain symptoms, pain on application of pressure, current or past swelling and stiffness, the presence of rheumatic diseases in a population, and evaluation of physical limitations, coping, and treatments received. It also includes a validated version of the Health Assessment Questionnaire Disability Index (HAQ-DI) for measuring functional capacity. The Mexican COPCORD Core Questionnaire (CCQ) version 2, and sociodemographic questionnaires were validated in the community of Las Cocuizas, Venezuela, in two pilot studies, the first on 100 individuals and the second on 300 individuals, to cross-culturally adapt the questionnaire according to international guidelines [23].

Interview

Phase 1: training of six interviewers and coordination Individuals ≥18 years old who had lived in the community for at least 12 months before the interview were recruited. The COPCORD questionnaires were administered in a home setting, in a door-to-door survey. If the subject was not contactable during the first visit, repeat visits were conducted up to three more times, at different times of day and days of the week, including holidays. The surveys were cross-checked by the interviewers on the day of administration and were subsequently verified by the coordination staff.

Phase 2 clinical evaluation by primary care physicians The COPCORD questionnaire was considered positive when individuals reported MSK pain >1 on visual analog scale (VAS) (0–10) during the last 7 days and/or a history of pain. All COPCORD-positive individuals were scheduled for medical examination, including those who reported MSK pain associated with trauma. The medical examination was conducted on the day of the interview by six primary care physicians in the community who received training on rheumatic diseases for 3 months before the study. All positive and uncertain cases and some negative cases (30 % randomly selected to avoid

false negatives) were reviewed by board-certified rheumatologists (next phase). All positive cases underwent clinical assessment. The cases suggestive of a rheumatic disease were clinically assessed by a board-certified rheumatologist.

Phase 3: clinical evaluation by a rheumatologist The subjects with suspected rheumatic disease were evaluated in the community by three certified rheumatologists to confirm the diagnosis and to provide follow-up care. For diagnosis of osteoarthritis (OA) [24, 25], RA [26], fibromyalgia [27], and systemic lupus erythematosus (SLE) [28], we used the American College of Rheumatology criteria; for gout, we used the Wallace criteria [29]; and for ankylosing spondylitis, we used the modified New York criteria [30]. For nonspecific cases of MSK disorders, we used the International Classification of Diseases, 10th revision [31]. All individuals meeting international criteria underwent laboratory and radiographic studies to confirm their diagnoses.

For diagnoses of mechanical and inflammatory back pain [32, 33] and rheumatic regional pain syndromes (RRPS) [34], we used specific questionnaires validated in our population. Arthralgias, myalgias, and nonspecific pain that did not meet the classification criteria for other rheumatic diseases were defined as MSK disorders. The maximum time period between interview and medical examination by a specialist was 7 days. Laboratory or radiographic studies were ordered based on the results of an examination by a rheumatologist.

Statistical analysis

Microsoft Access for Windows was used to store the obtained and coded data. We carried out an exploratory analysis of the variables included in the theoretical model. The analysis yielded measures of central tendency and dispersion for continuous variables and absolute and relative frequencies for ordinal, nominal, or categorical variables. Prevalence (%) and 95 % confidence interval (CI) were calculated for all variables included in the COPCORD screening questionnaire. Prevalence was calculated based on the proportion of individuals meeting the criteria for each rheumatic disease as established by a rheumatologist, divided by the population surveyed.

A logistic regression model was used to describe variables associated with a rheumatic disease. The dependent variable was defined as having a rheumatic disease as diagnosed by a rheumatologist. The independent variables used in the model included age, gender, having a job at the time of the interview, pain in the last 7 days and a history of pain, pain intensity, current or past physical limitations, functional disability as measured by HAQ-DI, and receiving treatment for MSK disorders. We also carried out a goodness-of-fit test and a model performance analysis (sensitivity, specificity, likelihood ratios, and receiver operating characteristic curves).

Results

We visited 1,237 homes and obtained a response rate of 99.51 %. We analyzed 3,973 questionnaires, 1,606 (40.4 %) from men and 2,367 from women. The mean age of the participants was 43.7 years (standard deviation (SD) 17.6). The mean duration of education was 8.9 years (SD 3.7), and 1,843 (46.4 %) subjects were employed at the time of the study. Of 2,130 unemployed subjects, 305 (14.3 %) were without a job for health reasons. The monthly income was less than US$568.87 for 79.2 % of subjects, and 2,344 (59.8 %) owned a house (Table 1).

The most frequent self-reported comorbidities were high blood pressure in 1,030 (25.9 %), peripheral vascular disease in 890 (22.3 %), hyperlipidemia in 705 (17.7 %), gastritis in 642 (16.1 %), and rheumatic diseases in 62 (1.5 %; mainly RRPS and back pain with one each of fibromyalgia and SLE).

Prevalence of pain

A total of 891 subjects (22.4 %; 95 % CI 21.1–23.8 %) reported MSK pain 7 days prior to the interview. Excluding trauma, the prevalence was 19.9 % (95 % CI 18.7–21.2 %),

Table 1 Sociodemographic data (*n*=3,973)

	n (%)
Women	2,367 (59.6)
Age, mean (SD, range), years	43.6 (17.6; 18–100)
Education, mean (SD, range), years	8.9 (3.7; 0–18)
Marital status, *n* (%)	
Married	1,887 (47.5)
Unmarried	2,086 (52.5)
Employment[a]	1,843 (46.4)
Monthly income (US$)[b]	
<569	1,580 (79.2)
569–1,208	402 (20.1)
1,209–2,417	7 (03)
>2,417	3 (0.1)
Type of medical cover	
Public	3,571 (89.8)
Private	369 (6.7)
Not answered	133 (3.3)

SD standard deviation

[a] Due to rheumatic diseases (302/1,843 (16.3 %))

[b] There were 1,981 (49.8 %) who did not answer this question; official US dollar to Bolivar rate was 4.30 in 2011

with a mean VAS pain intensity of 6.3 (SD 2.2); 30.1 % (95 % CI 28.7–31.6 %) reported pain at some point in life (historical pain) (Table 2). The most common sites of MSK pain were the knees in 617 of the total sample (15 %; 95 % CI 14.4–16.6 %), back in 300 (7.5 %; 95 % CI 6.7–8.4 %), hands in 250 (6.3 %; 95 % CI 5.6–7.1 %), shoulders in 239 (6.0 %; 95 % CI 5.2–6.8 %), and cervical spine in 217 (5.4 %; 95 % CI 4.7–6.2 %).

Physical limitations related to pain

Functional limitations were reported by 4.7 % of respondents at the time of the examination; 16.5 % had experienced limitation in the past; 78.6 % did not report any limitations in the past. Of those who had pain in the last 7 days, 48.4 % (432/891) found difficulty in coping with it (Table 2).

Diagnosis

The following diagnoses were made: OA in 15.0 % of the total sample (95 % CI 13.9–16.1 %), RRPS in 6.3 % (95 % CI 5.5–7.1 %), back pain in 2.8 % (95 % CI 2.3–3.4 %), rheumatoid arthritis in 0.4 % (95 % CI 0.2–0.6 %), crystal arthropathy in 0.3 % (95 % CI 0.1–0.5 %), fibromyalgia in 0.2 % (95 % CI 0.1–0.4 %), and SLE in 0.07 % (95 % CI 0.01–0.2 %) (Table 3).

Table 2 Description of musculoskeletal disorders

Variables	n=3,973; n (%; 95 % CI)
Musculoskeletal pain 7 days	891 (22.4; 21.1–23.8)
Trauma-related	99/891 (11.0; 9.0–13.3)
Pain intensity 7 days (VAS, 0–10), mean (SD)	6.3 (2.1)
Historical musculoskeletal pain	1,198 (30.1; 28.7–31.6)
Trauma-related	807/1,198 (67.3; 64.3–70)
Historical pain intensity (VAS, 0–10), mean (SD)	6.3 (2.2)
Total musculoskeletal pain (7 days+historical)	842 (21.1; 19.9–22.4)
Physical limitation (pain 7 days+historical)	
Past physical limitation	139/842 (16.5; 14.0–19.1)
Current physical limitation	40/842 (4.7; 3.4–6.4)
Never had limitations	662/842 (78.6; 75.6–81.6)
Failure to cope with pain in the last 7 days	432/891 (48.4; 45.1–51.8)
Musculoskeletal pain severity 7 days (VAS, 0–10)	6.3 (2.4)
Median HAQ-DI (IQR)	0.5 (0.2–0.9)
Treatment	954 (23.9; 22.6–25.3)
Complementary and alternative medicine	107 (2.6; 2.2–3.2)
Physiotherapy	257 (6.4; 5.7–7.2)

CI confidence interval, IQR interquartile range

Treatment

Nearly one quarter (23.9 %) of participants took some type of medication, 6.4 % received physical therapy, and 2.6 % received alternative treatment. The most commonly used drugs by therapeutic class in the last 7 days were the following: nonsteroidal anti-inflammatory drugs in 690/891 (77.4 %), analgesics in 59/891 (6.6 %), B complex drugs in 45/891 (5.0 %), calcium in 39 (4.3 %), corticosteroids in 19 (2.1 %), glucosamine in 9 (1.0 %), and disease-modifying drugs (DMARDs) in 7 (0.7 %). Of the patients diagnosed with RA (n=17), six were receiving no treatment as they were newly diagnosed (n=2) or had discontinued treatment (n=4), ten received DMARDs, and one received biological treatment.

Factors associated with a diagnosis of rheumatic disease

Table 4 shows the results of the logistic regression model, with any rheumatic disease as the dependent variable. The variables that were significantly associated with rheumatic disease were older age, presence of pain in the past, receiving treatment for musculoskeletal disorders, and functional disability (HAQ-DI). The goodness-of-fit test appears to be adequate

Table 3 The prevalence of rheumatic diseases in a Venezuelan urban community (n=3,973)

	n (%)	95 % CI
Osteoarthritis	597 (15.0)	13.9–16.1
Localized	561 (14.1)	13.0–15.2
Knee	218 (5.4)	4.7–6.2
Hands	82 (2.0)	1.6–2.5
Lower Cervical	62 (1.5)	1.1–1.9
Knee to hands[a]	61 (1.5)	1.1–1.9
Lower back spine	12 (0.3)	0.1–0.5
Others[a]	126 (3.1)	2.6–3.7
Generalized	36 (0.9)	0.6–1.2
RRPS	251 (6.3)	5.5–7.1
Back pain	115 (2.8)	2.3–3.4
Mechanical back pain	107 (2.6)	2.2–3.2
Inflammatory back pain	8 (0.2)	0.08–0.3
Osteoporosis	25 (0.6)	0.4–0.9
Undifferentiated arthritis	13 (0.3)	0.1–0.5
Rheumatoid arthritis	17 (0.4)	0.2–0.6
Crystal arthropathy	12 (0.3)	0.1–0.5
Fibromyalgia	11 (0.2)	0.1–0.4
Systemic lupus erythematosus	3 (0.07)	0.01–0.2
Spondyloarthropathies[b]	6 (0.1)	0.05–0.3

RRPS rheumatic regional pain syndromes

[a] Shoulders, ankles, and hips

[b] Psoriatic arthropathy (n=4) and ankylosing spondylitis (n=2)

Table 4 Result logistic regression analysis with using CCQ items like associated variables and diagnosis of rheumatic disease as the dependent variable

	OR (95 % CI)	p
Age	1.05 (1.04–1.06)	<0.001
Historical pain	7.7 (5.8–10.2)	<0.001
Treatment	8.3 (6.3–10.9)	<0.001
Functional disability (HAQ-DI)	4.7 (3.3–6.6)	<0.001
R^2	60.0 %	<0.001

OR odds ratio, *CI* confidence interval

and with little covariance, with a sensitivity of 87.8 %, a specificity of 93.5 %, and an area under the curve of 97.3 %.

Discussion

This study found a prevalence of MSK pain in the last 7 days of 22.4 %, which is consistent with the results of previous COPCORD studies conducted in sample urban populations worldwide, ranging from 12 % (Vietnam) [7] to 47 % (Peru) [10]. Studies using the COPCORD methodology performed in Latin America have reported a high prevalence of MSK pain, e.g., 30.4 % in Brazil [16], 25 % in Mexico [13, 14], 43.9 % in Cuba [17, 18], and 50.1 % in Peru [19], though the prevalence reported for Guatemala was relatively low at 11.8 % [20]. These differences in the prevalence of pain may be associated with social variables such as economic deprivation [2], ethnic and cultural factors, living in an urban or rural setting [10], and environmental and genetic factors [34, 35].

The knees, back, and hands were the most affected parts of the body. This is consistent with studies conducted in other Latin American countries, using the same methodology [13–20]. The prevalence of current (4.7 %) and past (16.5 %) physical limitations in this study, compared with other COPCORD studies undertaken in urban settings, was higher than that in Mexico City and northern Mexico (1.4 and 1.2 %, respectively) [13, 36], but lower than that in Brazil (24.5 and 32 %, respectively) [17] and in southeastern Mexico (6.6 and 21 %, respectively) [34].

This study found that a large proportion of subjects had difficulty coping with pain (48.3 %), which is higher than that in many regions of Mexico (2.1, 8, and 26 %) [13, 35, 37]. Cultural differences on how to cope with pain could be one of the reasons behind this difference [38–40].

OA was the most common rheumatic disorder in our study, with a prevalence of 15.0 %. These results are similar to those reported in other studies conducted in Mexico [13, 36], Cuba [18], Peru [19], and Guatemala [20], but lower than the prevalence of 58.18 % reported by Chirinos et al. in a study

conducted in Pueblo Nuevo, Falcón, Venezuela [21]. This latter may be explained by methodological differences, including sampling type, sample selection, and methods of estimation, because these could lead to over- or underreporting of the prevalence of osteoarthritis in Venezuela. Back pain was the second most prevalent diagnosis in this sample (2.8 %). This is lower than that in Mexico (6.3 and 8.0 %) [13, 33], Peru (7.0 %) [19], and Cuba (11.6 %) [18], but higher than that in Guatemala (0.5 %) [20]. The prevalence of RA was 0.4 %, similar to that reported in Brazil (0.46 %) [16] and Peru (0.4 %) [19]; slightly higher than that in Indonesia (0.2 %), Malaysia (0.3 %), the Philippines (0.17 %), Thailand (0.12 %), and Vietnam (0.28 %) [7]; and lower than that in Cuba (1.2 %) [18] and Mexico (2.8 %) [37]. In addition to genetic variations in the prevalence of rheumatic diseases, another aspect reported in all COPCORD studies is a difference in the prevalence of these diseases between urban and rural communities. A more thorough analysis of these results, including the potential risk factors, is needed to explore factors behind these differences.

The study population had access to primary and secondary health care, including rehabilitation services. Nearly 90 % of the population used public health care, and a small percentage used private health-care services. Physiotherapy treatment had been used by 6.4 %, which is higher than that in previous COPCORD studies in Latin America [13–20]. Despite living in an urban area, 2.6 % of patients reported relying on traditional medicine, a figure comparable to that in Cuba (2 %) [18] and Mexico (1.9 %) [14], but lower than that in India (4.5 %) [7]. The ethnic diversity and strong cultural roots that characterize Latino populations can explain these results.

The variables associated with the prevalence of rheumatic disease, such as a history of pain, use of appropriate treatments, pain severity, and limited functional capacity, are in line with those reported elsewhere [14–19].

The acceptance response rate of the study population in our study was 99.51 %, which is similar to that reported in other studies [38] and considerably higher than that reported in other urban studies (43 %) [14, 36].

There are a number of limitations of this study. Cross-sectional measurement of data does not allow causal inferences and, in some cases, may be bidirectional. Moreover, the sample size may affect the estimates. Furthermore, this result applies only to populations of the state included in this report. This study was conducted in an urban area, and the results may not be directly extrapolated to rural communities in Venezuela. CCQ is a screening tool that detects MSK diseases accompanied by such symptoms as pain, stiffness, and disability. This may result in underreporting or false negatives in diseases not accompanied by pain at the onset, such as osteoporosis and certain cases of asymptomatic osteoarthritis. For negative cases, this study relied on laboratory or imaging studies (e.g., densitometry or X-ray studies) to detect asymptomatic cases.

Conclusions

The prevalence of MSK disorders found in the study was 22.4 %. The most prevalent disease was osteoarthritis, and factors associated with the presence of a rheumatic disease were age, pain in the past, receiving treatment for musculoskeletal disorders, and physical disability. This study should help contribute to the design of health-care policies in Venezuela.

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