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Prevalence, co-occurrence, and predictive factors for musculoskeletal pain among shellfish gatherers

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Abstract
The aims of this study are to determine prevalence and co-occurrence of musculoskeletal pain (MSP) among shellfish gatherers and its consequences for the use of medicine, health care, and sickness leave and to investigate predictive factors (sociodemographic, lifestyle, comorbidity) of MSP in five anatomical areas (neck/shoulder/higher back, lower back, elbow/wrist/hand, hip/knee, and leg/ankle/foot). Nine hundred twenty-nine shellfish gatherers (94% women) voluntarily took part in a physiotherapy workshop. A self-administered questionnaire was used to assess MSP and its consequences. Regression models were performed to determine the factors predicting the presence of MSP. The two most frequently self-reported forms of MSP were neck pain (70.9%) and lower back pain (65.5%). Sixty-four percent of respondents reported contact with their family doctor during the last 12 months due to MSP, and most subjects (88.1%) reported MSP in two or more locations. Hip/knee pain was associated with leg/ankle/foot pain (crude odds ratio = 3.14). Logistic regression analysis showed that being female and young is associated with lumbar pain, and being older is associated with pain in all areas of the lower limbs. The number of pain sites a person reported significantly predicted the presence of pain in all the anatomical areas studied. Prevalence of MSP and musculoskeletal comorbidity were high. The study shows that the presence of pain reported in one body area is highly dependent on the total number of painful areas. These findings are consistent with those of similar studies.

Keywords
Comorbidity Gender Musculoskeletal diseases Shellfish gatherers

Introduction

Musculoskeletal disorders have become increasingly common worldwide during the last two decades. It is a common cause of work-related disability with substantial financial consequences due to sick leave, work disability, and health care costs [1–3].

Most studies examining the occurrence of musculoskeletal pain (MSP) have focused on a specific anatomic site such as the lower back, neck, or upper extremities. There is some evidence however that subjects often report MSP in multiple body sites. Musculoskeletal comorbidity has been reported both in the general population [4–6] and among occupational samples [7, 8]. It has also been found that having pain in one site increases the risk of developing it in others [9].

Various work-related factors have been established as predisposing the musculoskeletal disorders. Occupations with a high physical work strain, non-neutral postures, prolonged static muscle contractions, and repetitive movements are regarded as harboring an increased risk of suffering MSP [10, 11]. Some reports describe a high prevalence of musculoskeletal complaints in multiple body sites in occupations with manual work [12, 13].

Shellfish gathering is described as "the undertaking of extraction activities, carried out on foot or from a boat (…), using selective and specific methods for the capture of one or more species of molluscs (…) for commercial purposes." Shellfish gatherers working on foot are mostly women with a high physical workload involving in particular, forced postures (one of the most frequently adopted postures is that of forward flexion of the trunk, either from a standing or from a kneeling position), the manual handling of loads (for example, directly drawing out the shellfish buried in the sand and/or water, also lifting and carrying the load to control points), or repetitive movements (shellfish gatherers repetitively use one or both of their upper limbs, depending on the extraction technique). They use tools similar to those employed in agriculture, but adapted for use in the water. They are manual workers who, in general, have a low level both of education and income (average annual income is 5,646 euros, though this figure varies enormously from one area to another) [14]. They are self-employed and belong to a special group within

the Spanish National Insurance System, the "Special Regime for Sea Workers," one third of which is funded by the state, due to the special hardships associated with the type of work they perform [14, 15]. Gago [14] concluded that the majority of women who work in the fishing sector (including shellfish gatherers working on foot) admit to suffering from some type of disorder or illness which they associate with the type of activity they carry out, amongst which the most frequent types of problem include musculoskeletal disorders. However, to our knowledge, no study could be found which examined the prevalence, characteristics, and consequences of MSP among these workers. The aims of this cross-sectional study are to determine the prevalence of MSP in different and multiple body areas among shellfish gatherers and to investigate the predictive factors (sociodemographic, lifestyle, and comorbidity) for the presence of MSP in five large anatomical areas.

Materials and methods

This is a cross-sectional survey of workers in the fishing sector in Galicia (in the northwest of Spain). Data collection for the study was conducted from January 2008 until February 2009. Informed written consent was obtained from the subjects, and the study was approved by the ethical review board (ERB) of the Autonomous Region of Galicia (CEIC, ID number 2009/298).

Participants

The study took into account all of the fishermen's guilds in the Autonomous Region of Galicia where shellfish-gathering activities are carried out on foot. This is a total of 44 guilds, representing a population of 3,970 workers in Galicia alone, of whom 93.95% are women [16]. The sample was taken during voluntary participation in a workshop of preventive physiotherapy, and the exclusion criteria for the sample were simply those people who did not wish to participate in the study. In order to encourage participation in this workshop, the research team produced material to publicize it (posters, DVD), in which information was included relating to the aims of the workshop and what actions the shellfish gatherers would have to perform in order to take part in it. This information was included for the first time in the "International Conference on Prevention and Safety Measures in Shallow-water Fishing" and in the Technical Session of the "European Musculoskeletal Disorders Week". Both events were held in Galicia in 2007 and included participation by the presidents of the women's shellfish gatherers associations. In order to publicize these workshops more widely, Galician fishing promotion agents in each gathering area delivered materials to the workers in each association and reached an agreement on the date, place, and time when the workshops would be held, in order to guarantee the greatest possible attendance, whereby a maximum of 20 people would take part in each session. A total of 929 employees and 34 fishermen's guilds participated in the study. This sample size allowed us to estimate the parameters of interest with a certainty rate of 95% ($\alpha = 0.05$) and an accuracy of ±3.2%.

Measures

A self-administered, paper-based questionnaire was distributed by the researchers during the physiotherapy workshop explaining the purpose of the research and clarifying any doubts to all participants. The workers were asked to detail their sociodemographic characteristics (age, gender, length of time of employment as shellfish gatherers, geographic area of work), questions on lifestyle (smoking, physical activity during leisure time (minimum 30 min/three times per week)) and on general comorbidity. This comorbidity was ascertained by six dichotomized questions about rheumatic disorders (degenerative joint diseases or inflammatory joint), depressive syndrome, diabetes mellitus, neoplasms, back surgery, and other conditions. Some information on consequences due to musculoskeletal pain was also collected such as: (a) consumption of medicines to relieve MSP and type of medicines usually taken, (b) health care utilization and type of care seeking during the last 12 months (contact with family doctor, medical specialist, physiotherapist, or other health professional), and (c) self-reported sick leave data regarding time taken off work due to MSP during the pasta 2 months, up to and including the present time [17, 18].

Musculoskeletal pain was assessed by means of the following questions: (a) "Are you suffering from MSP today?" (yes/no). If the answer was yes, the subject was asked about the intensity of such pain on the verbal numerical scale (VNS) [19]. On the VNS the worker was asked to "score" her/his pain between 0 which represented "no pain" and 10 which represented "the worst pain imaginable"; (b) present state of MSP in relation to work and quality of sleep, with answers having four options; (c) Where do you regularly have MSP? The options included multiple choice answers relating to 11 different body regions.

To obtain an overall picture of concurrent MSP in the whole body, the original 11 anatomical sites were combined to make up five larger anatomical areas [5]: neck, shoulder, or higher part of the back; lower part of the back; elbow or wrist/hand; hip or knee; and leg or ankle/foot. A total score of the number of painful site, the co-occurrence of MSP (musculoskeletal comorbidity), and crude odds ratio for MSP in one anatomical area relative to another was also calculated [4, 6, 7, 12, 13].

Statistical analysis

Descriptive techniques were used to present the variables included in the study. The quantitative variables are expressed as the mean with standard deviation (SD). The qualitative variables are expressed as an absolute value, as a percentage, and their 95% confidence interval (CI). The chi-square test (χ^2) and odds ratio with 95% confidence intervals were calculated as measures of association of categorical variables. Comparison of mean values was carried out by use of the Student *t* test or the Mann–Whitney *U* test, depending on which was more appropriate, after verifying normality with the Kolmogorov–Smirnov test.

To test whether pain is likely to affect multiple body sites in some individuals, the number of subjects expected to have 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, or 11 sites with pain was calculated following the Poisson distribution. The prevalence of the pain in different anatomical areas in a subject was assumed to be independent of the presence of pain in other sites. The distribution parameter used to generate the expected number of subjects was the average number of sites with pain per individual. The observed frequencies were compared with the expected frequencies, assuming a Poisson distribution and using the chi-square test. In order to measure the correlation of pain in different anatomical areas, the crude odds ratio and 95% confidence interval were calculated.

Logistic regression analysis was performed to determine the factors predicting the presence of MSP in the five given anatomical areas. Variables significantly associated with musculoskeletal pain, in bivariate analyses ($\alpha = \leq 0.05$) and clinical relevant variables, were introduced into the models. The data were analyzed using version 17 of SPSS.

Results

Basic characteristics of the study's population are given in Table 1. The mean age of the workers was 50.6 ± 8.8 years (range 18–69), and the sample is predominantly female (98.7%). The mean duration of employment as shellfish gatherers was 21.8 ± 13.0 years. The greatest percentage of participants corresponds to women of age range 55–64 years (39.4%) and 45–54 years (35.4%).

Table 1. Description of the sample according to baseline characteristics, lifestyle, general comorbidity, and consequences of musculoskeletal pain (n = 929)

Variable	Number	Percent (95% CI)	Mean ± SD	Median	Range
Sociodemographic variables					
Age (years)	926		50.64 ± 8.8	52	18–69
Gender					
Females	917	98.7 (97.7; 99.3)			
Males	12	1.3 (0.7; 2.3)			
Years working as shellfish gatherers	918		21.8 ± 13.0	20	0–56
Lifestyle					
Smoking (yes)	160	17.3 (14.9; 19.9)			
Cigarettes/day (number)	150		12.5 ± 8.1	10	1–40
Physical activity during leisure time (yes)	420	45.3 (42.1; 48.6)			
General comorbidity (self-report)					
Rheumatic disorders (yes)	159	17.2 (14.8; 19.8)			
Depressive syndrome (yes)	149	16.1 (13.8; 18.6)			
Diabetes mellitus (yes)	33	3.6 (2.5; 5.0)			
Neoplasms (yes)	26	2.8 (1.9; 4.1)			
Back surgery (yes)	9	1.0 (0.5; 1.9)			
Other diseases (yes)	276	29.8 (26.9; 32.8)			
With current pharmacological treatment for relief of MSP	398	43.0 (39.8; 46.2)			
Type of medicines usually taken					
NSAID (yes)	448	48.3 (45.1; 51.6)			
Analgesics (yes)	322	34.7 (31.7; 38.0)			
Gastric protectants (yes)	161	17.4 (15.0; 20.0)			
Muscle relaxants (yes)	127	13.7 (11.6; 16.1)			
Anxiolytics (yes)	100	10.8 (8.9; 13.0)			
Steroids (yes)	28	3.0 (2.1; 4.4)			
Others (yes)	224	24.2 (21.5; 27.1)			
Consulting for MSP, last year (yes)	658	71.1 (68.0; 74.0)			
Family doctor	594	64.2 (61.0; 67.3)			
Medical specialist	366	39.6 (36.4; 42.8)			
Physiotherapist	237	25.6 (22.9; 28.6)			
Other health professional	117	12.6 (10.6; 15.0)			
Sick leave because of MSP					
Has taken sick leave due to MSP in the last 2 months	104	11.3 (9.3; 13.5)			
Currently off work	72	7.8 (6.2; 9.8)			
Duration of sick leave, last episode (days)	502		158.9 ± 150.0	90	3–900

CI confidence interval, *SD* standard deviation, *MSP* musculoskeletal pain, *NSAID* nonsteroidal anti-inflammatory drugs

The characteristics of the sample according to lifestyle, general comorbidity, pharmacological treatment, medical consultations undertaken, and sick leave from work due to musculoskeletal pain are also given in Table 1. The most frequently reported general comorbidities were rheumatic disorders (17.2%) and depressive syndrome (16.1%). Almost half of the sample (43.0%) is currently being treated pharmacologically for relief of MSP. Drugs most frequently consumed are nonsteroidal anti-inflammatory drugs (NSAIDs, 48.3%) and analgesics (34.7%). Most of those surveyed (71.1%) had consulted a health professional for MSP in the last 12 months, especially the family doctor (64.2%). Eleven percent of workers in the study group have been off work during different periods within the last 2 months.

Tables 2, 3, and 4 show statistics for the prevalence of MSP in single and multiple body regions. The point prevalence was 66.5%, and the mean pain intensity score was 6.1 ± 1.8 points, (range 2–10). For 37.3% of subjects, pain and weariness persisted even during rest periods. Based on those localizations where pain is felt regularly, neck pain was the most common (70.9%), followed by that in the lower back (65.5%) and shoulders (45.8%). By anatomical area groupings, the most common pain site corresponded to the neck/shoulder/higher back area, in which 82.4% of the total is located (Table 2).

Table 2. Description of the sample according prevalence of MSP and its localization (n = 929)

Variable	Number	Percent (95% CI)
Has MSP today	616	66.5 (63.3; 69.5)
Current situation of MSP		
"Pain and weariness only while at work[a]"	217	23.5 (20.8; 26.4)
"Pain and weariness disturb sleep pattern[b]"	295	32.0 (29.0; 35.1)
"Pain and weariness even during rest periods[c]"	344	37.3 (34.2; 40.5)
No reply given	67	7.3 (5.7; 9.2)
MSP localization (based on regularly pain location)		
Neck	657	70.9 (67.8; 73.8)
Low back	607	65.5 (62.3; 68.5)
Shoulders	425	45.8 (42.6; 49.1)
Wrist/hands	399	43.0 (39.8; 46.3)
Hips	304	32.8 (29.8; 36.0)
Knees	300	32.4 (29.4; 35.5)
Legs	239	25.8 (23.0; 28.7)
Upper back	202	21.8 (19.2; 24.6)
Elbows	195	21.0 (18.5; 23.8)
Ankles/feet	161	17.4 (15.0; 20.0)
Others	58	6.3 (4.8; 8.1)
MSP localization according to anatomical area groupings		
Neck/shoulders/higher back	764	82.4 (79.8; 84.8)
Lower back	607	65.5 (62.3; 68.5)
Elbow/wrist/hand	473	51.0 (47.8; 54.3)
Hip/knee	449	48.4 (45.2; 51.7)
Leg/ankle/foot	318	34.3 (31.3; 37.5)

CI confidence interval, *SD* standard deviation
[a]Pain and weariness appear during working hours, but disappear when subject is not at work
[b]Pain and weariness appear at start of work and do not disappear at night, disturbing sleep and reducing work capacity
[c]Pain and weariness persist even during rest periods and make even the realization of the most trivial tasks difficult

Table 3. Observed and expected numbers of sites with musculoskeletal pain in shellfish gatherers

Number of sites	Observed		Expected[a]	
	Number	Percentage	Number	Percentage
0	9	1.0	11	2.2
1	101	10.9	41	8.3
2	190	20.5	79	16.0
3	207	22.4	101	20.4
4	135	14.6	96	19.4
5	95	10.3	74	14.9
6	64	6.9	47	9.5
7	41	4.4	26	5.3
8	36	3.9	12	2.4
9	21	2.3	5	1.0
10	17	1.8	2	0.4
11	10	1.1	1	0.2
p value[b]			0.0001	

Mean (SD) = 3.8 (2.3); median = 3.0; range (minimum–maximum) = 0–11
[a]Assuming a Poisson distribution
[b] *p* value, the χ^2 test compares observed and expected frequencies

Table 4. Crude odds ratio (95% CI) for the association between musculoskeletal pain in different anatomical areas

Anatomical area groupings	Neck, shoulders, higher back	Lower back	Elbow, wrist/hand	Hip, knee	Leg, ankle/foot
Neck, shoulders, higher back	–	–	–	–	–
Lower back	0.87 (0.60; 1.24)	–	–	–	–
Elbow, wrist/hand	1.53* (1.09; 2.15)	1.42* (1.08; 1.86)	–	–	–
Hip, knee	2.02** (1.42; 2.88)	1.65** (1.26; 2.17)	1.74** (1.34; 2.26)	–	–
Leg, ankle/foot	1.26 (0.88; 1.82)	1.68** (1.25; 2.26)	2.41** (1.82; 3.18)	3.14** (2.36; 4.17)	–

CI confidence interval
*$p < 0.05$; **$p \leq 0.001$

The median of pain site localizations was three sites (range 0–11). Only 10.9% reported having pain at a single site, and the vast majority (88.2%) reported pain in two or more sites. In the majority of the cases postulated (number of localizations), it was found that observed frequencies significantly outnumber expected frequencies ($p = 0.0001$, Table 3).

The correlation between pain in the different anatomical areas, measured in terms of crude odds ratio are shown in Table 4. The greatest correlation exists between pain in the hip/knee area and that in the leg/ankle/foot region, followed by the correlation between the presence of pain in the elbow/wrist/hand and the leg/ankle/foot areas.

Logistic regression models relating the presence of MSP (according to five different pain localizations) and the variables studied are presented in Table 5. The variable predicting the presence of pain in the neck/shoulders/higher back area and in the elbow/wrist/hand area is the number of localizations of musculoskeletal pain ($p = 0.000$). Being young ($p = 0.01$), being a female ($p = 0.02$), and the number of musculoskeletal pain sites ($p = 0.000$) are factors predicting the presence of lumbar pain.

Table 5. Logistic regression models for predicting neck–shoulders–higher back, lower back, elbow-wrist/hand, hip-knee and leg-ankle/foot pain, adjusting for different variables

Variable	Musculoskeletal pain in different anatomical area groupings									
	Neck, shoulders, higher back		Lower back		Elbow, wrist/hand		Hip, knee		Leg, ankle/foot	
	p value	Adjusted OR (95% CI)	*p* value	Adjusted OR (95% CI)	*p* value	Adjusted OR (95% CI)	*p* value	Adjusted OR (95% CI)	*p* value	Adjusted OR (95% CI)
Gender (females/males)	0.66	1.40 (0.32; 6.19)	0.02[a]	5.83 (1.34; 25.3)	0.54	1.56 (0.38; 6.40)	0.66	0.72 (0.16; 3.15)	0.68	0.73 (0.17; 3.21)
Age (years)	0.96	1.00 (0.98; 1.03)	0.01[a]	0.97 (0.95; 0.99)	0.14	0.98 (0.96; 1.01)	0.01[a]	1.03 (1.01; 1.06)	0.045[a]	1.03 (1.00; 1.05)
Years working as shellfish gatherers	0.84	0.99 (0.98; 1.02)	0.62	1.00 (0.99; 1.02)	0.99	1.00 (0.99; 1.01)	0.45	1.01 (0.99; 1.02)	0.98	1.00 (0.99; 1.02)
Smoking (yes/no)	0.88	0.96 (0.58; 1.61)	0.26	0.79 (0.52; 1.19)	0.62	1.11 (0.73; 1.69)	0.07	0.65 (0.41; 1.04)	0.25	1.32 (0.82; 2.12)
Physical activity during leisure time (yes/no)	0.85	0.96 (0.65; 1.43)	0.17	1.24 (0.91; 1.68)	0.26	0.84 (0.62; 1.14)	0.48	0.89 (0.63; 1.24)	0.84	0.97 (0.68; 1.36)
Rheumatic disorders (yes/no)	0.24	0.69 (0.37; 1.29)	0.86	0.96 (0.61; 1.51)	0.81	0.95 (0.61; 1.47)	0.88	0.96 (0.60; 1.55)	0.75	0.93 (0.59; 1.47)
Depressive syndrome (yes/no)	0.62	1.16 (0.64; 2.11)	0.25	0.77 (0.50; 1.19)	0.84	0.95 (0.61; 1.49)	0.51	1.17 (0.73; 1.89)	0.63	1.13 (0.70; 1.82)
Diabetes mellitus (yes/no)	–	–	–	–	–	–	–	–	0.11	2.09 (0.85; 5.13)
Number of sites with MSP (0–11)	0.000[a]	2.68 (2.23; 3.22)	0.000[a]	1.68 (1.53; 1.86)	0.000[a]	1.95 (1.76; 2.16)	0.000[a]	2.31 (2.05; 2.61)	0.000[a]	2.04 (1.84; 2.27)
Constant	0.14	0.24	0.16	0.30	0.03	0.15	0.000	0.013	0.000	0.01

MSP musculoskeletal pain
[a]Statistically significant difference

The presence of pain in the lower limbs is associated with more advanced age ($p = 0.01$ in hip/knee pain, $p = 0.045$ in leg/ankle/foot pain) and also the number of musculoskeletal pain sites ($p = 0.000$). The number of sites of musculoskeletal pain is the variable which most significantly predicts the presence of MSP in any of the five anatomical areas with logistic regression analysis.

Discussion

In this study information has been supplied concerning the burden of musculoskeletal pain in shellfish gatherers. The fact that the majority of shellfish gatherers working on foot are middle-aged women was also highlighted by the study. According to the data from the research, both musculoskeletal pain (66.5%) and musculoskeletal comorbidity (88.1%) are very high among shellfish gatherers. Neck pain was the most common, with seven out of 10 subjects reporting it. However, the prevalence of musculoskeletal pain in other body regions was also substantial. Owing to the shortage of studies about MSP among these workers, we have undertaken an overview of the prevalence of musculoskeletal pain in other female occupational samples (Table 6). It presents six studies among nurses, municipal employees, kitchen workers, laundry employees, and nurses' aides, of which women make up between 66% and 100% of the workers reflected in this table. We have also included the 6th National Survey of Working Conditions in Spain [20] as, although only 29.6% are women, the data correspond to the sector of workers to which shellfish gatherers also belong. In the studies reviewed, the assessment and definition of the anatomical locations and pain varied, as did the results in terms of the prevalence of pain; however, our overall estimates are higher than those usually reported in these female occupational samples and support the observation that MSP is most frequent in the neck, lower back, and shoulders.

Table 6. Overview of prevalence of musculoskeletal pain among workers (mainly women) focusing on several anatomical sites

Country, workers, study [reference]	Sex (female), %	Age[a]	Number studied	Description of MSP	Prevalence	Percentage
USA, hospital nurses of 3 hospitals in the states of Ohio and Kentucky, postal questionnaire [21]	91.3	≥30 and ≤50 (64%)	263	Pain in the last 30 days	Lower back	74.1
					Neck	55.2
					Ankles/feet	52.5
					Shoulders	50.0
					Knees/lower legs	49.8
					Upper back	40.2
					Hips/thighs	37.5
					Hands/wrists	25.7
					Fingers	20.7
					Elbows/forearms	12.3
Finland, municipal employees of the city of Helsinki, mailed survey [7]	80.3	40–60	5,829	Experiencing pain at the moment	Neck or shoulders	28.0
					One or both legs	18.0
					Low back	16.0
					One or both arms	16.0
					Head and facial area	7.0
					Other areas	5.0
Finland, kitchen workers, randomized controlled intervention [13]	100	19–63	504	Pain in the last 3 months	Neck	71.0
					Low back	50.0
					Forearm or hand	49.0
					Shoulders	34.0
					Ankle or foot	30.0
					Knee	29.0
					Hip	19.0
The Netherlands, laundry employees, questionnaire with one of the researchers present [39]	66	36.7	373	Pain in the past 12 months	Low back	50.0
					Shoulders	45.0
					Neck	31.0
					Elbow, wrist, hand	24.0
Norway, nurses' aides, mailed survey [40]	96.2	30–59 (89%)	6,485	Pain during the previous 14 days	Lower back	54.9
					Neck	53.5
					Shoulder	47.1
					Head	41.9
					Upper back	27.3
					Hip	26.6
					Wrists or hands	20.8
					Knee	20.5
					Ankle or foot	15.5
					Elbow	11.7
The Netherlands, nurses of 4 nursing homes who take care of disabled or geriatric patients, interview in group meeting [41]	89.8	29.0	846	"Pain that you suffer regularly"	Low back	33.8
					Neck	22.9
					Shoulder or upper arm	19.5
					Knee or lower leg	10.2
					Upper back	7.9
					Hip or upper leg	6.9
					Wrist or hand	5.7
					Ankle or foot	3.7
					Elbow or under arm	2.3
Spain, Spanish workers in different sectors (agriculture, stockbreeding, fisheries) [20]	29.6	16–65	686	Multiple choice questions about body areas where pain is felt that subject relates with her/his work	Lower back	53.4
					Neck	30.9
					Upper back	26.2
					Upper arm or forearm	18.4
					Legs	15.5
					Shoulders	11.5

[a]In years, mean or range

It must be noted that most shellfish gatherers reporting musculoskeletal pain experienced it at several sites and that localized pain was relatively rare. We described this phenomenon using several approaches.

As for the number of pain sites, we found that only 11% refer to having *regularly* pain in one anatomical region, which contrasts with the 88% who refer pain in 2 or more of 11 possible sites, and the average number of pain sites was 3. This considerable overlap in MSP has also been reported in other studies on working populations [8, 12]; the prevalence of at least two pain sites varies between 73%, as mentioned by Haukka et al. [13] with regards to female kitchen workers, and 33% in Miranda et al. [8] from a study on a cross-section of the Finnish population. The prevalence of the combination of pain complaints was invariably greater than expected on the assumption of independence, a finding which has also been described in other studies [5, 13].

A significant crude odds ratio was found between pain in one anatomical area and pain at another site. The highest association was between hip/knee pain and leg/ankle/foot pain. The present study will not allow us to establish a causal relationship, but Haukka et al. [13] found that ankle or foot pain had significant prevalence ratios of 2.2 for hip pain and 2.1 for knee pain. Other associations this study has discovered, such as those between lumbar pain and pain in lower limbs or between neck/back/shoulder pain and that in the distal part of the upper limb, have also been described in other studies [7, 8, 12]. Yeung et al. [12] find that the risk of having pain both in the lumbar region and in some part of the lower limb is between 1.9 and 2.7 in manual workers, and the risk of suffering pain in the neck and some part of the upper limb presents values of between 1.5 and 2.6. Daraiseh et al. [21], in a study of nursing staff, found a significant relationship between lumbar pain and that in all other anatomical regions, but especially associated with pain in the lower limb. Holmberg et al. [22], in a study involving farm workers, found a similar correlation between lumbar pain and pain in the hip and knee. The present findings add a little more literature on the co-occurrence of pain symptoms among occupational samples.

We have also found, in the multiple logistic regression models, that the most influential factor in the presence of pain in any of the five anatomical areas studied is the number of pain sites. Both our results and those of other authors [9, 23] suggest that the effects of pain in one bodily location are influenced by the total burden of pain. Musculoskeletal pain in one site is more likely to occur in the presence of pain in another area, and this premise seems to hold true independently of the pain site involved.

These findings are consistent with the present state of knowledge concerning the neurophysiology of chronic pain, such as the phenomena of hyperalgesia, allodynia, and (especially) central sensitization, which explain how pain generalization is produced [24]. The high concurrence of pain in different anatomical areas found in this study may also reflect common pathogenesis. There is evidence that exposure to repetitive motion patterns, forceful exertion, and non-neutral body postures (both dynamic and static) may cause musculoskeletal disorders in one or more anatomical site [11, 25]. The combination of several of these risk factors can be identified in the work tasks carried out by shellfish gatherers.

A substantial proportion of workers with MSP (71.1%) sought medical care for their complaints during the past 12 months. Other authors have already pointed out the large percentage of consultations in general practice due to MSP [3, 26].

Absence due to sickness in our study is difficult to compare with absenteeism in similar studies because rates reported have been both scarce and irregular. However, in accordance with previous findings, we observed that the majority of those with pain did not report work leave because of their MSP [5], though it is possible that those workers who were taking leave due to MSP at the time when the study was being conducted did not take part in workshops.

It is commonly held that women report higher rates of musculoskeletal pain than men [27–29]. However, in our study, we only found an association between being a woman and lower back pain. Even though our study did not allow us to explain the possible influence of gender on lower back pain, in Fillingim and others' review [30], it is suggested that this finding may be attributable to several factors, among which are biological factors such as hormonal contributions. This review discusses the impact of gonadal hormones on the differences between males and females in several aspects, among which are: (a) perception of pain, (b) inflammatory response, and (c) the processing of pain in the central nervous system. On the other hand, postmenopausal women using hormone replacement and oral contraceptives have shown increased risk for back pain [31, 32]. Other factors, such as gender roles or cognitive/affective variables, may also play a part [30].

As for age, we found that younger subjects suffer more lumbar pain. In the literature reviewed, we found that in general, prevalence of lumbar pain is greater during working age, especially in the age range from 35 to 50 years and decreases from 65 years onwards [33, 34]. Reviewing da Costa and Vieira [11], youth is one of the risk factors for lumbar pain, with reasonably strong evidence presented. At the same time, we found that the oldest subjects present more pain in the lower body. The correlation between the prevalence of lower limb pain and advanced age has been established by other authors [35]. It is conceivable that underlying factors such as degenerative changes in the musculoskeletal system and the

climatic and other conditions in which shellfish gatherers work (submerged up to the waist in cold seawater) could contribute to this.

There are several limitations to consider in evaluating this research. Firstly, participants were volunteers, so clearly this bias in selection may have had some influence on results. In any event, 77.3% of fishermen's guilds participated in the study and the sociodemographic characteristics of nonparticipants are similar to the sample group: within the total population of shellfish gatherers, 94% are women and 67% are between 40 and 60 years of age [16]. Within our sample, 98% are women and the mean age is 51 years old. On the other hand, our findings with reference to the prevalence of MSP are consistent with those obtained in a survey undertaken by the doctors of the Galician Institute of Safety and Health in the Workplace [36] on these women workers. In these surveys it is found, for example, that 55% refer lumbar pain, which they put down to their work. Thus we can objectively say that the characteristics of participants are similar to those who did not take part, with reference to variables of sex, age, and prevalence of MSP. Secondly, the design used in this study is cross-sectional; therefore, causality of the associations cannot be established from the findings. Thirdly, this study may suffer from information bias since most data were based on self-reports: (a) owing to the complex and subjective nature of pain, self-report methods appear to be the best approach to assessment, often being more informative and capturing patient impact better [25]; (b) to register general comorbidity a validated questionnaire has not been used, nevertheless one study [37] suggests that self-reports for the ascertained prevalence of common diseases show good validity; (c) for the measurement of sick leave, official registers may be more reliable [38], however studies on the reliability and validity of self-reports on sickness absence have shown that these might be considered a valuable source [17, 18].

Conclusions

The results of this study show that musculoskeletal pain is very common among shellfish gatherers, with neck pain being the most common form. Furthermore, the presence of pain in each of the five areas studied was strongly influenced by the number of pain sites. These findings suggest that for the design of clinical and epidemiological studies, the assessment of the number of pain locations should be considered because musculoskeletal comorbidity has implications for etiology. While the common focus on single body sites is important, more emphasis is needed on multiple musculoskeletal pain sites. These results need to be contrasted with other studies, due to the shortage of information concerning MSP among this group of workers.

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Disclosures

None.

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