Prevalence of musculoskeletal disorders in the lower limbs among artisanal fisherwomen / shellfish gatherers of Brazil

Prevalência de distúrbios musculoesqueléticos nos membros inferiores de pescadoras artesanais/marisqueiras do Brasil

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Abstract

Introduction: Small-scale fishing is responsible for at least 40% of the fish consumed in the world. In Brazil, the worker in this sector is the artisanal fisherman, who accounts for one in every 200 Brazilians. Artisanal fishing is part of the informal economy; therefore, the pathologies that affect these fishermen are invisible in the country's official statistics. Musculoskeletal disorders represent a major socioeconomic and public health problem, but their prevalence is little known among non-formal workers. Objective: to estimate the prevalence of musculoskeletal disorders (MSDs) in the lower limbs and to verify the associated factors among artisanal fishermen/ fisherwomen from Saubara, Bahia, Brazil. Methodology: a cross-sectional study, using the Nordic Musculoskeletal Questionnaire (NMQ), the Brazilian version of the Job Content Questionnaire (JCQ) and a questionnaire about physical demands, were used to collect information in a random sample of artisanal fishermen/shellfish gatherers, in 2013. Results: the prevalence of MSDs in lower limbs in the sample was 65.5% (n=137). The prevalence of MSDs in the thigh/knee segment, leg and ankle/foot were 48.7% (n=92), 47.7% (n=95) and 38.1% (n=72), respectively. There was also a high frequency of obesity, poor education, low wages, early age at onset of labor, and excessive workload. Factors such as age, smoking, physical demands, working time, absence of breaks and having had a previous job were associated with MSDs in the lower limbs. Conclusion: the high prevalence of MSDs in lower limbs in female artisanal fishermen indicates the need to develop strategies for prevention, diagnosis and reporting of these diseases.
Keywords: Artisanal fisherwomen; shellfish gatherers; musculoskeletal disorders.

Resumo

Introdução: a pesca em pequena escala é responsável por pelo menos 40% do pescado consumido no mundo e, no Brasil, o trabalhador desse setor é o pescador artesanal, que contabiliza um a cada 200 brasileiros. Por se tratar de uma atividade da economia informal, as patologias que afetam esses pescadores são praticamente invisíveis nas estatísticas oficiais do país. Nesse contexto, os distúrbios musculoesqueléticos representam um grande problema socioeconômico e de saúde pública, mas sua prevalência é pouco conhecida entre trabalhadores não formais. **Objetivo:** estimar a prevalência de distúrbios musculoesqueléticos nos membros inferiores e fatores associados, em pescadores artesanais/marisqueiras de Saubara, Bahia, Brasil. **Metodologia:** trata-se de um estudo transversal, utilizando o Nordic Musculoskeletal Questionnaire, a versão brasileira do Job Content Questionnaire e um questionário sobre demandas físicas, para a coleta de informações em uma amostra aleatória de pescadores artesanais/marisqueiras, ocorrida em 2013. **Resultados:** a prevalência de distúrbios musculoesqueléticos em membros inferiores na amostra foi de 65,5% (n=137); a prevalência no segmento coxa/joelho, perna e tornozelo/pé foi de 48,7% (n=92), 47,7% (n=95) e 38,1% (n=72), respectivamente. Observaram-se também alta frequência de obesidade, baixa escolaridade, baixos salários, idade precoce para o início do trabalho e carga horária excessiva. Fatores como idade, tabagismo, demandas físicas, tempo de trabalho, ausência de pausas e trabalho anterior, estavam associados aos referidos distúrbios. **Conclusão:** A alta prevalência de distúrbios musculoesqueléticos dos membros inferiores em pescadoras artesanais indica a necessidade de desenvolver estratégias de prevenção, diagnóstico e notificação dessas doenças.
Palavras-chave: Pescadores artesanais; marisqueiras; distúrbios musculoesqueléticos.

INTRODUCTION

Disorders affecting the musculoskeletal system, called musculoskeletal disorders (MSDs), are injuries that affect muscles, tendons, ligaments, joints, nerves, and blood vessels, and are one of the most common occupational health

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problems.[1] MSDs affect various occupational groups[2], for example, some epidemiological studies focus on the occupational health of artisanal fishermen [3,4].

MSDs generate great demand for health resources and lead to serious socio-economic losses [5]. In Brazil, there are several reasons for why MSDs are currently a major socio-economic and public health problem, including the prevalence in the population, the wide range of industrial sectors that are impacted, the clinical complexity and high therapeutic costs, and the absence from work due to temporary or permanent disability[6].

Musculoskeletal disorders that affect the lower limbs results in disability and suffering for workers, impairing their movement and consequently their ability to carry out certain work-related activities[7]. Bispo et al.[2] (2022) conducted a study in the countryside of Alagoas and Bahia with professionals in the health, education, commerce and industry sectors identified a higher prevalence of musculoskeletal dysfunctions in the lower limbs.

Despite the advances made in the recognition of MSDs as work-related, little is known about these disorders in workers who comprise the informal sector or perform classical artisanal activities, such as artisanal fishing and shellfish gathering[8].The Food and Agriculture Organization (FAO) recognizes the importance of small-scale fisheries in poverty reduction and food security. In fact, artisanal fisheries are key elements in the FAO's goal of maintaining the balance between growth of the fisheries sector and of conservation priorities, which requires a balance between industrial fishing and artisanal aquaculture[9].

Artisanal fishers represent a significant share of informal workers in Brazil. Approximately 45% of the annual fish production comes from artisanal fisheries, making this activity one of the largest social and economic forces in Brazil. The majority of artisanal fishermen in the country are concentrated in the Northeastern states, comprising 47% of the total[10].

The work process of women artisanal fishermen/ fisherwomen influences the appearance of MSDs. While employment may be related to these disorders, there is a lack of epidemiological studies on the prevalence of MSDs and the association between working conditions and the development of MSDs in female artisanal fishermen/shellfish gatherers[11]. Based on the significance of artisanal fishing/shellfish gathering to the economy and social importance of this activity in Brazil, it is necessary to conduct epidemiological studies to better understand the impacts of MSDs on artisanal fishers. This study aims to estimate the prevalence of MSDs in the lower limbs and its associated factors in artisanal fishermen/shellfish gatherers of Saubara, Bahia, Brazil.

METHODOLOGY

A cross-sectional study and a review of literature were conducted. The former is nested with a larger project entitled "Health, Environment and Sustainability of Workers of Artisanal Fisheries", approved by the Research Ethics Committee of the School of Medicine at the Federal University of Bahia (statement nº 356.261). Informed consent of study participants was obtained before they completed questionnaires.

Related to this project, research was also conducted with the same population to estimate the presence of MSDs in the upper limbs and lower back[11,12].

Population and Area

Saubara is a municipality in the state of Bahia located inside the Baía de Todos os Santos (Todos os Santos Bay). This city is situated 94 kilometers from Salvador, the capital of the state of Bahia and less than 20 kilometers per nautical route. In 2010, Saubara had 11,201 inhabitants, of which 48.9% are men and 51.1% are women[13]. The economically active population (EAP) in Saubara is made up of 5,196 people[13], of which approximately 568 or 11, 142 (25%) are men and 426 (75%) are women were registered in the Association of Shellfish Gatherers of Saubara as artisanal fishermen and shellfish gatherers. This makes artisanal fishing/shellfish gathering one of the main local economic activities, for the inhabitants of this community. We chose to only investigate female workers because, with some exceptions, women generally carry out the gathering and processing of shellfish, while men are mainly responsible for the fish harvesting and marketing process.

Sampling and Inclusion Criteria

The selection of participants was conducted using a simple random sampling without replacement. The sample was obtained from the full registry at the Association of Shellfish Gatherers in Saubara. To calculate sample size, we used the prevalence of 50%, 5% error and a 95% confidence level. Based on this formula and adding 10% for possible losses, 209 artisanal female fishermen/shellfish gatherers were interviewed, 3% more than the minimum based on the sample size calculation.

For the selection of survey respondents, inclusion criteria were: female gender (since this activity is mainly performed by women in the community); shellfish gathering as a primary occupation; residing in Saubara; 18 years or older; and consent to participate in the study. To minimize the healthy worker effect, artisanal fishermen/shellfish gatherers that were not engaging in the activity had the opportunity to participate if their work absence was due to illness and, possibly related to MSDs. A team of 10 interviewers, six undergraduate students and four master's students, received training prior to administering a structured questionnaire to community members during a pilot study. This was to verify that the instrument was relevant to the local community. Data collection took place between April 10 and May 10, 2013.

The questionnaire contained the following items: identification, sociodemographic characteristics, job

information, current and past occupational history, time working as a shellfish gatherer, daily working hours; lifestyle habits such as smoking, alcohol consumption, use of medication, and physical activity; presence of co-morbidities; housework; musculoskeletal symptoms; and physical and psychosocial demands at work. Most of the information was obtained from the interview, except for weight, height and waist circumference (WC). Weight and height were measured to calculate the body mass index (BMI), and WC was taken to evaluate the accumulation of abdominal fat.

A questionnaire previously developed by Fernandes[14] and validated by Fernandes et al.[15] (2019) was adapted to the physical demands according to the work stages of artisanal fisher/shellfish gathering (gathering, washing, transport, cooking and processing). The questions covered the following items: work postures (sitting, standing, walking, crouching, with upper body leaning forward, trunk in rotation position, arms above shoulder height); repetitive and precise movements with hands; muscle force exerted with arms; and cargo handling. The variables were measured as the frequency, severity, and duration on a six-point response scale (zero to five), with anchors at the beginning and end ranges of the scale.

The variables related to psychosocial demands were evaluated using scores for psychological demands, control and social support at work, using the Job Content Questionnaire (JCQ)[16, 17]. Exposure to psychosocial demands was classified as high or low, according to Devereux and contributors[18] the female shellfish gatherers with high exposure to these demands were defined as a composite score of demand greater than 34, control/autonomy over work equal to or less than 66, and social support equal to or less than 13. Low exposure was classified as demand equal to or less than 34, and control and social support greater than 66 and 13, respectively. At least two of these criteria had to be met for female shellfish gatherers to be classified in each group.

The information about musculoskeletal symptoms in the lower limbs was collected through the expanded version of the Nordic Musculoskeletal Questionnaire (NMQ), an instrument that measures the presence of pain or discomfort in the previous 12 months in anatomical regions of the musculoskeletal system, as well as the severity, the duration and frequency of these symptoms[19].

A lower limb MSDs "case" was considered as having pain or discomfort in at least one body segment in the 12 months preceding data collection, with a minimum duration of one week or monthly minimum frequency. Symptoms had to be associated with at least one of the following: ≥ 3 degree of severity on a scale from 0 to 5; seeking medical attention for the problem; absence from work; or change of work due to health restriction[19]. To calculate overall MSDs, we considered the presence of this disorder in at least one of the body segments analyzed (thigh, knee, leg, ankle and foot) in the last 12 months of work.

Statistical Analysis

The statistical program R i386, version 2.15.2, was used in the descriptive analysis. Measures of central tendency and dispersion were calculated for continuous variables and frequency measures for categorical variables.

A factor analysis was conducted on a group of variables related to physical demands during the stages of gathering, transportation, and processing. Physical demands variables related to the lower limbs that had a Pearson correlation value of at least 0.2 were selected to perform a facto analysis. The determination of the number of factors was based on eigenvalues greater than 1, using the method of estimation principal component.

The pre-selection of independent variables for inclusion in the initial multiple logistic regression model for each body segment was based on univariate regressions, considering a p-value of less than 0.25 in the Wald test, as recommended by Hosmer and Lemeshow (2000)[20]. The plausibility of biological associations was also considered when deciding which variables to include in the initial models.

The final models were obtained using the backward selection method, based on the Likelihood-ratio test and Wald test, and considering a 5% significance level. To calculate adjusted prevalence ratios and their respective 95% confidence intervals for the variables in the final model, we used the delta method[21], which provides a good approximation for means, variances, and covariances of nonlinear functions for one or more variables. For all models, a goodness-of-fit test was performed using Le Cessie and Houwelingen (1991)[22] method, which indicated a good fit for the model. The quantile-quantile plot for the residuals with a 95% envelope was constructed and did not show any atypical observation.

RESULTS

In this study, we investigated 209 female artisanal fishermen/shellfish gatherers, representing almost half of those registered with the Association of Shellfish Gatherers of Saubara. The mean age of study participants was 39.6 years (SD: 11.5 years), and the mean monthly income from shellfish gathering was $137.10 BRL (the equivalent of 69.40 USD, based on the exchange rate on May 10, 2013) (SD : $104.70 BRL or $ 53 USD). The majority of the interviewees were black (59.8%) or brown (36.4%), with low education levels (74.7% had not completed high school), married or living with a spouse (64.6%) and had children (91.9%). About one-third of participants were overweight (37.8%) or obese (32.5%). Among the respondents, 21.1% consumed alcohol at least once a week (Table 1). Regarding work-related activities, the mean age they began work was 12.7 years (SD: 7.2), and the majority of respondents (70.8%) did not work with other economic activities other than small-scale fishing/shellfish gathering. The average number of days of work per week was 4.1 (SD: 1.3) and the average number of hours worked per

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day was 8.4 (SD: 3.0). Approximately 148 (70.8%) female artisanal fishers/shellfish gatherers said they take breaks during the working day, with an average of 2 breaks per working day (SD: 1.1) (Table 1).

Table 1 – *Socio-demographic aspects, lifestyle and clinical features of the shellfish gatherers of Saubara, Bahia, Brazil, 2013 (n = 209).*

VARIABLE		TOTAL
CONTINUOUS VARIABLES	**Mean**	**(SD)**
Age (years)	39.60	11.50
Income obtained from the shellfish gathering (in R$ reais)	137.10	104.70
Age started working on shellfish gathering (in years)	12.75	7.23
Number of days of the week that you work with shellfish gathering	4.13	1.32
Daily work with shellfish gathering (in hours)	8.44	3.03
Breaks during working with shellfish gathering (per working day)	2.26	1.10
CATEGORICAL VARIABLES	**n**	**(%)**
Age group		
> = 38 years	106	50.70
<38 years	103	49.30
Ethnicity		
Black	125	59.80
White	8	3.80
Brown	76	36.40
Birthplace		
Saubara	106	50.70
Santo Amaro	42	20.10
Salvador	23	11.10
Cachoeira	9	4.30
Other locations	29	13.80
Education		
Not studied / primary school	48	23.00
Complete elementary school / incomplete	94	45.00
Incomplete High School	14	6.70
Completed high school	53	25.40
Marital status		
Married/Cohabiting /Live-in	135	64.60
Single / widow / Separate	74	35.40
Children		
Yes	192	91.90
No	17	8.10
Execute other work besides shellfish gathering		
Yes	61	29.20
No	148	70.80

He had another job before working with shellfish gathering		
Yes	120	57.40
No	89	42.60
Performs breaks		
Yes	148	70.80
No	61	29.20
Habit of smoking		
Yes	11	5.30
No	198	94.70
Consumption of alcoholic beverages		
> = 1 to week	44	21.10
<1 to week	165	78.90
Practice physical activity in leisure time		
Yes	141	67.50
No	68	32.50
Body mass index (BMI)		
<=24,9	62	29.70
25 a 29,9	79	37.80
>=30	68	32.50
Presence of comorbidities		
Hypertension	57	27.30
Diabetes mellitus	14	6.70
Rheumatoid arthritis	22	10.50
Hypothyroidism	4	1.90

Source: survey data

The physical demands of the job affecting the lower limbs were also measured using a six point response scale (zero to five) and based on the main stages of shellfish preparation (gathering, transport and processing). In the "gathering" stage, there was a predominance of postures with the upper body leaning forward (3.9; SD: 1.5), squatting (3.5; SD: 1.7) and walking (2.8; SD: 1.6) and with respect to cargo handling, load lifting was common (3.3, SD: 1.7). Regarding the "transport" of shellfish, the most prevalent physical demands were walking postures (4.4, SD: 1.1), standing (3.2, SD: 2.0), and load lifting (3.6; SD: 1.5). As for "processing" of shellfish, a large number of shellfish gatherers use a posture in which the upper body is leaning forward (2.5, SD: 2.1), and perform load lifting (2.0; SD: 1.8) (Table 2).

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Table 2 – *Physical demands at work where there is greater demand of the lower limbs, according to the main stages of work of the shellfish gatherers of Saubara, Bahia, Brazil, 2013 (n = 209).*

VARIABLE PHYSICAL DEMANDS/	GATHERING		TRANSPORT		PROCESSING	
Postures	**Mean**	**(SD)**	**Mean**	**(SD)**	**Mean**	**(SD)**
Standing	1.81	1.77	3.22	2.00	0.73	1.35
Walking	2.84	1.59	4.44	1.13	0.68	1.35
Crouching	3.53	1.73	0.53	1.19	1.00	1.71
Upper body leaning forward	3.94	1.51	0.92	1.54	2.46	2.15
Shot trunk	2.29	1.96	0.59	1.16	1.45	1.16
Cargo Handling	**Mean**	**(SD)**	**Mean**	**(SD)**	**Mean**	**(SD)**
Push load	1.40	1.88	0.87	1.55	1.05	1.61
Pulling load	2.53	2.01	1.07	1.72	1.59	1.87
Lift cargo	3.35	1.67	3.60	1.46	2.01	1.85

Source: survey data.

The mean score for female artisanal fishermen/ shellfish gatherers exposed to psychological demands at work was 33.9 (SD: 4.6), while autonomy in work and receiving social support were 35.2 (SD: 5.8), 13.0 (SD: 2.1), respectively (Table 3).

Table 3 – *Psychosocial demands in the work of the shellfish gatherers of Saubara, Bahia, Brazil, 2013 (n = 209).*

PSYCHOSOCIAL DEMANDS	Mean	(SD)
Psychological Demand	33.92	4.56
Control	35.22	5.83
Social Support	13.03	2.09

Source: survey data.

Regarding the prevalence of pain, 163 (78%) respondents reported pain or discomfort in the lower limbs in the 12 months preceding the interview, with 123 (58.8%) reporting the presence of pain in the thigh/knee segment, and 112 (53.6%) and 72 (48.3%) reporting the presence of pain in the leg and ankle/foot, respectively. Based on the aforementioned criteria, the overall prevalence of MSD in the lower limbs was 65.5% (137/209). In individual lower limb regions 92 (48.7%), 95 (47.7%) and 72 (38.1%) of participants had MSD in the thigh/knee, leg, and ankle/ foot, respectively (Table 4).

Table 4 – *Prevalence of pain and MSD in any region of the body, the lower limbs and segments that make up the lower limbs separately (thigh, knee, leg, ankle and foot) in shellfish gatherers of Saubara, Bahia, Brazil, 2013 (n = 209).*

BODY SEGMENT	Pain in the last 12 months		MSD	
	n	%	n	%
In any region of the body (upper limb, lower limb or spine)	204	97.60	198	94.70
Lower limbs	163	78.00	137	65.50
Thigh / Knee*	123	65.07	92	48.70
Leg*	112	56.28	95	47.70
Ankle / Foot*	101	43.33	72	38.10

Source: survey data.

Notes: *These were excluded from the calculation of MSD in shellfish gatherers that suffered acute trauma in the segment of interest. For this reason, the number of shellfish gatherers sampled with MSD in thigh / knee segment was 189, in leg was 199 and ankle / foot was 189. The sample remained the same (n = 209) for the other ratings.

In the multivariate analysis, we noted that the MSD in the lower limbs showed statistically significant association with the factor 2 of the transport stage (standing postures and walking), showing that MSDs in the lower limbs were 33% more frequent in artisanal fishermen/shellfish gatherers who carry out transport standing or walking (PR=1.33 with 95% CI: 0.99-1.79). Factor 1 in the processing stage (standing posture, crouching and walking) showed that the MSD in the lower limbs were 34% [95% CI: 1.09-1.64] higher in shellfish gatherers performing the processing of shellfish in these conditions. In addition, the shellfish gatherers who had age above 38 years and who had less than 2 work breaks/day (≤2 breaks) were respectively 75% PR: 1.75; [95% CI: 1.38 – 2.21] and 34% PR: 1.34; [95% CI: 1.11-1.60] higher MSD lower limb compared with the shellfish gatherers who were young and performed more than two breaks/day" (Table 5).

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Table 5 – *Factors associated with MSD in the lower limbs, prevalence ratios (PR), prevalence ratios adjusted (PR*) and their respective confidence intervals (95% CI) for a sample (n= 209) of artisanal fishers / shellfish gatherers of Saubara, Bahia, Brazil, in 2013.*

VARIABLES	Number	%	Prevalence (%)	PR	95% CI	PR*	95% CI
Age:							
18 – 38 years	103	49.29	50.48	1.00			
> 38 years	106	50.71	80.18	1.58	[1.28-1.96]	1.75	[1.38-2.21]
Education:							
Incomplete High School	53	25.35	54.71	1.00			
Complete High School	156	74.65	69.23	1.26	[0.96-1.65]		
Marital status:							
Single/Separated/Widow	74	35.40	70.27	1.00			
Married/Cohabiting /Live-in partner	135	64.60	62.96	0.89	[0.73-1.09]		
Presence of children:							
No	17	8.14	64.70	1.00			
Yes	192	91.86	65.62	1.01	[0.70-1.46]		
Smoking habit:							
No	198	94.73	64.14	1.00			
Yes	11	5.27	90.90	1.41	[1.14-1.75]		
Alcohol consumption:							
<Once a week	165	78.95	66.06	1.00			
≥ Once a week	44	21.05	63.63	0.96	[0.75-1.23]		
Physical activity practiced during leisure:							
Yes	141	67.46	63.12	1.00			
No	68	32.54	70.58	1.11	[0.91-1.36]		
Diabetes mellitus:							
No	195	93.30	64.10	1.00			
Yes	14	6.70	85.71	1.33	[1.05-1.69]		
Hypertension:							
No	152	72.72	61.84	1.00			
Yes	57	27.28	75.45	1.21	[1.00-1.48]		
Rheumatoid arthritis:							
No	187	89.47	63.10	1,00			
Yes	22	10.53	86.36	1.36	[1.12-1.66]		
Body mass index (BMI):			.				
BMI < 25 (normal weight or underweight).	63	30.14	63.49	1.00			
BMI >24,9 (obesity or overweight)	146	69.86	66.43	1.04	[0.83-1.30]		
Waist circumference (WC):							
≤ 80	53	25.36	66.03	1.00			
> 80	156	74.64	65.38	0.99	[0.79-1.23]		
Current job:							
No	148	70.81	65.54	1.00			
Yes	61	29.18	65.57	1.00	[0.80-1.24]		
Previous job:							
No	89	57.42	57.30	1.00			
Yes	120	42.58	71.66	1.25	[1.01-1.54]		
Hours working:							
≤ 7 hours/day	119	56.94	66.38	1.00			
>7 hours/day	90	43.06	64.44	0.97	[0.79-1.18]		
Years of work:							
≤ 26 years	103	49.29	53.39	1.00			
>26 years	106	50.71	77.35	1.44	[1.17-1.78]		
Breaks:							
>2 work breaks /day	148	70.81	62.16	1.00			
≤2 work breaks /day	61	29.19	73.77	1.18	[0.97-1.44]	1.34	[1.11-1.60]
Housework:							
<7 hours/day	49	23.44	73.46	1.00			
≥7 hours/day	160	76.56	63.12	0.85	[0.69-1.05]		

Psychological demand:							
No	90	43.06	64.44	1.00			
Yes	119	56.93	66.38	1.03	[0.84-1.25]		
Control work:							
Yes	109	52.15	66.05	1.00			
No	100	47.85	65.00	0.98	[0.80-1.19]		
Social support:							
Yes	109	52.15	68.80	1.00			
No	100	47.85	62.00	0.90	[0.73-1.09]		
Gathering:							
Factor 1 (rotated trunk, pushing load, load pull and lift load).	52	24.88	73.07	1.15	[0.94-1.42]		
Factor 2 (standing posture and walking).	157	75.11	68.78	1.23	[0.94-1.60]		
Factor 3 (crouching posture and the upper body leaning forward).	157	75.11	69.42	1.28	[0.98-1.69]		
Transport:							
Factor 1 (crouched posture with the trunk rotated, push and pull load charge).	77	36.84	68.83	1.08	[0.88-1.31]		
Factor 2 (standing posture and walking).	116	55.50	62.93	0.91	[0.75-1.11]	1.33	[0.99-1.79]
Factor 3 (up load).	110	52.63	62.72	0.91	[0.75-1.11]		
Processing:							
Factor 1 (posture while standing, walking and squatting).	91	43.54	71.42	1.17	[0.96-1.42]	1.34	[1.09-1.64]
Factor 2 (upper body leaning forward, trunk turned up and load).	105	50.24	69.52	1.12	[0.92-1.37]		

Source: survey data

DISCUSSION

In this investigation, some occupational factors were configured as contributors to the emergence of MSD in the lower limbs of artisanal fisherwomen / shellfish gatherers of Saubara, showing that working conditions imply the occurrence of these disorders. In addition to these determinants, individual characteristics such as age greater than 38 years, were also significant for the appearance of these conditions in this population.

The advanced age that 38 years was characterized as an important risk factor in this study is associated with the occurrence of MSD in the lower limbs. Similar results were observed in studies with shellfish gatherers and workers of different occupational segments[23-25].

According to the Occupational Safety and Health Administration (OSHA)[26], the occurrence of MSD tends to increase with advancing age, since the functional deficit and soft tissue strength loss caused by aging increase the probability of having a musculoskeletal injury, featuring MSD as one of the most symptomatic health problems in middle-aged people.

According to Remmen and contributors[27], in the systematic review of MSD in professional fishermen, there was a general MSD prevalence ranging from 15% to 93%. Rodriguez-Romero and contributors[24], studying musculoskeletal symptoms in shellfish gatherers of both sexes in the region of Galicia (Spain), found that older age was associated with the presence of MSD in the regions of hip / knee [PR: 1.03; 95% CI: 1.01 – 1.06], and leg / ankle / foot [PR = 1.03; 95% CI: 1.00-1.05]. Muller and contributors[28] studying in Brazil demonstrated and reinforced the gravity of the generalized MSD in 93.5% of the fishing community, particularly in these regions: lower back, wrist and hand and the upper back.

The overall prevalence of MSDs in the lower limbs was 65.5% (n = 137) with 78% of female artisanal fishermen/shellfish gatherers reporting pain in the previous 12 months. These health problems may compromise the work process, the performance of daily activities and quality of life of these workers.

The prevalence in this study was higher than that found in MSDs in the lower limbs of shellfish gatherers in Spain[24]. The greater prevalence detected in this study may be related to aspects inherent to the shellfish gatherers, such as the repetitive movements, non-ergonomic postures, joint overload, long working hours, inadequate breaks during the activity (2 breaks per working day), and the young age when gatherers begin work.

The associated factors that contribute to the appearance of MSDs in the lower limb are adoption of stressful and non-ergonomic postures such static standing, squatting and kneeling, in which the legs acting as internal drivers or moving (performing external motion) during the working day, while carrying, lifting or pushing heavy loads contribute to the development of MSDs in the lower limbs in shellfish gathering. Similar results were found in other occupations[2].

Although some studies have evidenced the high number of occupational hazards in the activity of artisanal fishing / shellfish gathering[29] and the impact of

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these determinants on the health of this occupational category[8,12,4], there is a lack of quality health services, health professionals trained to meet the demands of these populations, respecting the socio-cultural and environmental diversity of fishing communities.

When different segments that comprise the lower limbs were analyzed separately, the thigh/knee showed the highest prevalence of MSDs (48.7%), followed by the leg (47.7%) and ankle/foot (38.1%). These findings are similar to another study of shellfish gatherers in Rodriguez-Romero and contributors[24], where 46.8% MSD prevalence in the thigh/knee segment was observed.

Study of workers in other occupations also showed that the thigh and knee had the highest prevalence of MSDs in the lower limb. The study conducted by Nag and contributors[25] noted the knee (35%) as the most frequent site for MSDs in the lower segment of employees in the fish processing industry in India.

The information related to musculoskeletal symptoms was obtained using the Nordic Musculoskeletal Questionnaire (NMQ), an instrument that has often been used in epidemiological studies with industry workers and communities and aims to collect information (with validity, sensitivity and reproducibility) on the prevalence of musculoskeletal symptoms and interference at work and during leisure activities[30]. Most of the studies reviewed also used the NMQ. However, a novel approach in NMQ was used in this study. The NMQ was used to classify MSDs criteria, such as specificity and severity, unlike some other research that only used pain-related symptoms in the past 12 months or intensity of musculoskeletal discomfort.

One of the limitations of the cross-sectional study is that the study is performed at one specific point in time. As a result, cross-section studies only identifies survivors of the studied effect and fails to include workers who have been removed from the workforce as a result of injuries or diseases associated with their occupation[31]. In an effort to avoid this omission, we sought to include in this survey female artisanal fishermen/shellfish gatherers that had suspended work in the previous year, since their absence from work could have been related work-related injury.

CONCLUSION

This study revealed a high prevalence of MSDs in the lower limbs based on severity and specificity in female artisanal fishermen/shellfish gatherers. These workers are frequently exposed to several factors that favor the emergence of musculoskeletal disorders, mainly due to physical demands of work.

The invisibility of illnesses in this profession is due to the lack of access to health professionals and occupational health services. The former could help identify these disorders as work-related. Conversely, if these disorders are not linked to work, symptom exacerbation is probably, as occupational physical and psychosocial exposure will likely continue.

Study findings confirm that strategies are needed for prevention, diagnosis, and the reporting of illnesses and disorders in artisanal fishermen/shellfish gatherers, with the aim of developing health promotion policies. Moreover, health services, especially the Unified Health System (Sistema Único de Saúde, SUS) must be prepared to meet these conditions for approximately one million people involved in this sector of the informal economy.

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