Association between psychosocial factors in workers and multisite pain: cross-sectional study

Associação entre fatores psicossociais em trabalhadores e dor multirregional: estudo transversal

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ABSTRACT

BACKGROUND AND OBJECTIVES: Psychosocial factors may be associated with multisite pain, which is characterized by pain symptoms in more than one part of the body. The aim of the present study was to determine associations between psychosocial factors and multisite pain in a population of workers.

METHODS: A cross-sectional study was conducted involving 195 workers (educators, administrative technicians, healthcare workers, cleaners, and zookeepers). Psychosocial factors were evaluated using the short form of the second version of the Copenhagen Psychosocial Questionnaire. Multisite pain was identified using the Nordic Musculoskeletal Questionnaire.

RESULTS: Multisite pain was associated with quantitative demands (OR=1.31; 95% CI: 1.06-1.63), work pace (OR=1.20; 95% CI: 1.01-1.43), emotional demands (OR=1.39; 95% CI: 1.18-1.63), commitment to the workplace (OR=0.75; 95% CI: 0.62-0.91), predictability (OR=0.86; 95% CI: 0.76-0.99), job satisfaction (OR=0.53; 95% CI: 0.32-0.88), work-family conflict (OR=1.37; 95% CI: 1.16-1.62), justice (OR=0.81; 95% CI: 0.69-0.94), general health perception (OR=0.54; 95% CI: 0.38-0.76), burnout (OR=1.41; 95% CI: 1.17-1.69), and stress (OR=1.41; 95% CI: 1.18-1.68).

CONCLUSION: Several psychosocial factors were associated with multisite pain, indicating that these factors could be considered in the multisite pain management.

Keywords: Burnout psychological, Chronic pain, Stress psychological, Working environment.

RESUMO

JUSTIFICATIVA E OBJETIVOS: Fatores psicossociais podem estar associados à dor multirregional, caracterizada por sintomas de dor em mais de uma parte do corpo. O objetivo do presente estudo foi determinar associações entre fatores psicossociais e dor multirregional em uma população de trabalhadores.

MÉTODOS: Foi realizado um estudo transversal com 195 trabalhadores (professores, técnicos administrativos, profissionais de saúde, faxineiros e funcionários de zoológicos). Os fatores psicossociais foram avaliados por meio da versão abreviada da segunda versão do *Copenhagen Psychosocial Questionnaire*. A dor multirregional foi identificada por meio do *Nordic Musculoskeletal Questionnaire*.

RESULTADOS: A dor multirregional foi associada com demandas quantitativas (OR=1,31; IC 95%: 1,06-1,63), ritmo de trabalho (OR=1,20; IC 95%: 1,01-1,43), demandas emocionais (OR=1,39; IC 95%: 1,18- 1,63), compromisso com o local de trabalho (OR=0,75; IC 95%: 0,62-0,91), previsibilidade (OR=0,86; IC 95%: 0,76-0,99), satisfação no trabalho (OR=0,53; IC 95%: 0,32-0,88), conflito trabalho-família (OR=1,37; IC 95%: 1,16-1,62), justiça (OR=0,81; IC 95%: 0,69-0,94), percepção geral de saúde (OR=0,54; IC 95%: 0,38-0,76), *burnout* (OR=1,41; IC 95%: 1,17-1,69) e estresse (OR=1,41; IC 95%: 1,18-1,68).

CONCLUSÃO: Vários fatores psicossociais foram associados à dor multirregional, indicando que estes devem ser abordados no manejo da dor.

Descritores: Ambiente de trabalho, Dor crônica, Esgotamento psicológico, Estresse psicológico.

INTRODUCTION

Psychosocial work factors refer to the interaction between the workplace and human factors and can influence health, performance, and job satisfaction[1,2]. Workers with high work demands, limited control, and little support from supervisors and coworkers have higher levels of psychosocial stress in the workplace[1]. Moreover, psychosocial stress at work is associated with the development of chronic pain[3].

Musculoskeletal pain is quite common in the working population and has been associated with both high work demands and a low level of control[4-6]. There is evidence that pain in one body region increases the chance of pain occurring in other locations, which is known as multisite pain[7]. Workers with multisite pain are at greater risk of developing work disability[8]. Furthermore, a

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greater number of pain sites leads to a greater level of disability as well as worse physical and psychological health[9].

Studies have identified an association between multisite pain and psychosocial factors. Low social support is the most frequent factor associated with multisite pain[10-17]. However, high work demands[12-16,18] and low level of control[11,15,17] are also cited. Other authors report that job satisfaction[10,19], team spirit[19], work influence[12,18,19], and emotional demands[14] are predictive factors for multisite pain. However, most of these studies have evaluated psychosocial factors using the demand, control, and social support model[17], according to which the combination of high work demand and low control increases the risk of health problems and diminished wellbeing[1].

The Copenhagen Psychosocial Questionnaire (COPSOQ) is another instrument for the assessment of psychosocial factors. This questionnaire includes several concepts and theories and is not based on a single theoretical explanatory model of the relationship between psychosocial risk, workplace, and health[20-22]. The COPSOQ addresses relevant dimensions for investigation[22], enabling a more comprehensive assessment of psychosocial factors and may therefore allow focusing interventions on more specific factors, possibly increasing the effectiveness of such interventions at preventing and controlling multisite pain.

There is a need to study the relationship between psychosocial factors and multisite pain through an instrument that enables a more comprehensive evaluation of psychosocial factors, beyond the work demands and control. Thus, the aim of the present study was to determine associations between psychosocial factors and multisite pain in a population of workers using the short version of the COPSOQ II. The hypothesis is that there are associations between specific psychosocial factors and multisite pain.

METHODS

The present observational, cross-sectional study was reported in accordance with the recommendations of the STROBE initiative (Strengthening the Reporting of Observational Studies in Epidemiology)[23].

The inclusion criteria were individuals aged between 18 and 65 years old, working at the same function for at least six months, and having a minimum work routine of 20 hours per week[24]. The exclusion criterion was not having information on musculoskeletal symptoms.

Participants were recruited through social media, e-mails, and visits to their workplaces. The sample was composed of 195 workers: civil servants and service providers in the fields of education, health, administration, human resources, general services (cleaners and conservation), maintenance, and repair (building assistants and zookeepers) (Figure 1).

The occupations were grouped into blue-collar workers (healthcare workers, general services, maintenance, and repair) and white-collar workers (educators, healthcare professionals, administration staff, and human resources staff) following the classification[25].

This study received approval from the local institutional review board. All volunteers received clarifications regarding the purpose of the study and those who agreed to participate signed a Free and Informed Consent Term (FICT).

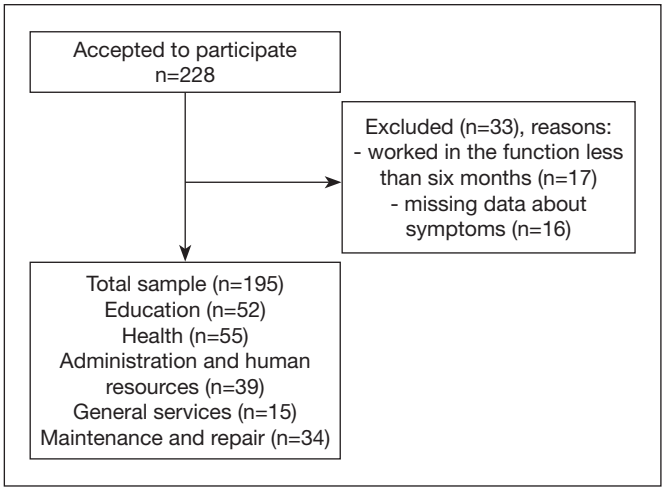

Figure 1. Flowchart of data collection process.

Data collection was performed with the aid of the following instruments: Sociodemographic questionnaire addressing personal data (age, gender, marital status, and schooling) and occupational data (function, job seniority, and hours of work per day); COPSOQ II-Br*:* short version of COPSOQ II-Br was used to assess psychosocial factors[26]. This questionnaire consists of 40 items[27] distributed among the following domains: demands at work, influence and development, meaning and commitment, interpersonal relationships, leadership, job satisfaction, work-family conflict, values in the workplace, general health, burnout and stress, and offensive behavior.

The items are scored on a Likert scale (0 = never/hardly ever, 1 = seldom, 2 = sometimes, 3 = often, 4 = always; or 0 = to a very small extent, 1 = to a small extent, 2 = somewhat, 3 = to a large extent, 4 = to a very large extent). Item 1B is the only one with an inverted score (0 = always, 1 = often, 2 = sometimes, 3 = seldom, 4 = never/hardly ever). The total score is the sum of the items of each domain, except for the offensive behavior domain[20] and Nordic Musculoskeletal Questionnaire (NMQ) administered to identify musculoskeletal symptoms in nine regions of the body in the previous seven days and 12 months, as well as investigate functional limitations and having sought health care due to these symptoms[28,29].

Participants reported the presence/absence (dichotomous characteristic) of musculoskeletal symptoms, such as pain, numbness, or discomfort in each region of the body. Multisite pain was defined by the sum of the number of regions with pain in the previous 12 months. The body regions were grouped into 1) neck and shoulders; 2) thoracic and lumbar region; 3) upper limbs (elbow and wrist/hand), and 4) lower limbs (hip, knee, and ankle/foot). If a worker had pain in two or more regions, multisite pain was recorded[19,30].

Procedures

Data collection took place from October 2016 to September 2018. The questionnaires were available in paper and online formats (Google Forms™).

The questionnaire in paper format was administered by a researcher at the workplace. The participants signed the FICT prior to participating in the study. Questionnaires were then distributed to the participants with a previous explanation about the questions and the assurance of confidentiality in the answers.

For the online questionnaire, the participants first had access to the FICT and those who agreed to the terms of the FICT proceeded to complete the questionnaires. The invitation with the link to complete the questionnaires was available on social and institutional media. If the participants had any questions, they could contact the researcher through an email address that was provided. The answering of the questionnaires did not lead to any additional hours of work or reduced wages.

This study was approved by the Institution Ethics Committee for Human Research (CAAE: 64255917.7.000).

Table 1. Sociodemographic data of sample (n=195)

Variables	n	%	Mean	SD
Age (years)	195		40.9	10.1
Gender	195			
Female	140	71.8		
Male	55	28.2		
Occupation	195			
Cleaning services	34	17.4		
Maintenance services	15	7.7		
Administrative services	39	20.0		
Healthcare services	55	28.2		
Education services	52	26.7		
Types of work	195			
Blue-collar	76	39.0		
White-collar	119	61.0		
Marital status	195			
Single/divorced/widowed	84	43.1		
Married/lives with partner	111	56.9		
Educational level	195			
Incomplete elementary school	21	10.8		
Complete elementary school	8	4.1		
Incomplete high school or technical	2	1.0		
Complete high school or technical	49	25.1		
Incomplete higher education	9	4.6		
Complete higher education	31	15.9		
Complete Post Graduation	75	38.5		
Company time (years)	193		4.9	7.2
Hours of work per week	195			
20-30	3	1.6		
35-45	175	89.7		
More than 45	17	8.7		
Work shift	195			
Day	167	85.6		
Night	28	14.4		

SD = standard deviation

Statistical analysis

Descriptive data analysis was performed using mean, standard deviation, and frequency values for the total and stratified sample of the study according to the occurrence of multisite pain.

Binomial logistic regression was performed to obtain odds ratios (OR) and 95% confidence intervals (CI) for estimates of the strength of the associations between psychosocial factors and multisite pain. The assumptions for the binomial logistic regression analysis were tested to investigate the occurrence of multicollinearity and outliers. No multicollinearity between the independent variables or any significant outliers were found. The confounding factors incorporated into the regression models were gender, age, and type of work. All statistical analyses were performed using IBM SPSS Statistics 21 (IBM Corp, Armonk, NY, USA).

RESULTS

Most workers were female (72%), 39% had completed post-graduation, and 86% worked during the day (Table 1).

Prevalence of multisite pain was 61.5% (95% CI: 54.6 to 68.1%). Symptoms were most frequent in the neck/shoulders and thoracic/lumbar region (Table 2).

Multisite pain was associated with several domains of the COPSOQ II. Association was direct (OR > 1) for some domains and inverse (OR < 1) for others. Domains with a direct association were demands at work, work-family conflict, burnout, and stress. Domains with an inverse association were meaning and commitment, predictability, job satisfaction, justice, and general health perception. Unadjusted and adjusted models presented similar results (Table 3).

Table 2. Characteristics of symptoms and psychosocial factors for total and stratified sample according to multisite pain (MSP)

Variables	Total sample (n = 195)				Without MSP (n = 75)				With MSP (n = 120)			
	n	%	Mean	SD	n	%	Mean	SD	n	%	Mean	SD
Musculoskeletal symptoms												
Neck/shoulder	119	61.0			14	18.7			105	87.5		
Thoracic/lumbar	120	61.5			12	16.0			108	90.0		
Upper limb	58	29.7			3	4.0			55	45.8		
Lower limb	99	50.8			11	14.7			88	73.3		

Continue...

Table 2. Characteristics of symptoms and psychosocial factors for total and stratified sample according to multisite pain (MSP) – continuation

Variables	Total sample (n = 195)				Without MSP (n = 75)				With MSP (n = 120)			
	n	%	Mean	SD	n	%	Mean	SD	n	%	Mean	SD
Number of regions with pain (0 to 4 regions)	195		2.0	1.4	75		0.5	0.5	120		3.0	0.8
None	35	17.9			35	46.7			-	-		
One region	40	20.5			40	53.3			-	-		
Two regions	39	20.0			-	-			39	32.5		
Three regions	46	23.7			-	-			46	38.3		
Four regions	35	17.9			-	-			35	29.2		
Psychosocial factors												
Demands at work	195		11.1	4.3	75		9.3	4.2	120		12.3	3.9
Influence and development	195		9.8	3.2	75		9.0	3.3	120		10.3	3.1
Meaning and commitment	195		13.2	2.9	75		13.8	2.2	120		12.9	3.3
Interpersonal relationships	195		15.7	5.4	75		16.2	5.6	120		15.4	5.2
Leadership	195		10.5	4.1	75		11.1	4.0	120		10.2	4.2
Job satisfaction	195		2.1	0.7	75		2.2	0.6	120		2.0	0.7
Work-family conflict	195		2.5	2.0	75		1.7	1.9	120		2.9	1.9
Values in workplace	195		10.3	3.9	75		11.0	4.1	120		9.9	3.8
General health perception	195		2.4	1.0	75		2.7	1.0	120		2.3	0.9
Burnout and stress	195		8.4	3.5	75		7.0	3.5	120		9.2	3.2
Offensive behavior	195		0.5	0.8	75		0.4	0.6	120		0.6	0.9

MSP = multisite pain; SD = standard deviation.

Table 3. Results of logistic regression analysis considering multisite pain as dependent variable

Psychosocial factors	Model I		Model II	
	OR	95% CI	OR	95% CI
Demands at work	**1.20**	**1.11 – 1.30**	**1.17**	**1.08 – 1.27**
Quantitative demands	**1.44**	**1.18 – 1.77**	**1.31**	**1.06 – 1.63**
Work pace	**1.23**	**1.04 – 1.45**	**1.20**	**1.01 – 1.43**
Emotional demands	**1.43**	**1.22 – 1.67**	**1.39**	**1.18 – 1.63**
Influence and development	**1.13**	**1.03 – 1.24**	1.07	0.97 – 1.18
Influence at work	**1.28**	**1.10 – 1.48**	1.17	0.99 – 1.37
Possibilities for development	1.10	0.93 – 1.29	1.02	0.85 – 1.21
Meaning and commitment	**0.89**	**0.79 – 0.99**	**0.88**	**0.78 – 0.99**
Meaning of work	0.94	0.76 – 1.15	0.95	0.76 – 1.19
Commitment to workplace	**0.77**	**0.64 – 0.93**	**0.75**	**0.62 – 0.91**
Interpersonal relations	0.97	0.92 – 1.03	0.96	0.91 – 1.02
Predictability	0.88	0.77 – 1.00	**0.86**	**0.76 – 0.99**
Recognition	0.95	0.83 – 1.08	0.93	0.81 – 1.06
Role clarity	1.03	0.87 – 1.21	1.01	0.85 – 1.20
Leadership	0.94	0.88 – 1.01	0.95	0.88 – 1.02
Quality of leadership	0.91	0.79 – 1.03	0.92	0.81 – 1.06
Social support	0.90	0.78 – 1.03	0.91	0.78 – 1.05
Job satisfaction	**0.59**	**0.37 – 0.94**	**0.53**	**0.32 – 0.88**
Work-family conflict	**1.39**	**1.18 – 1.63**	**1.37**	**1.16 – 1.62**
Values in workplace	0.93	0.86 – 1.01	0.92	0.85 – 1.00
Trust regarding management	0.96	0.84 – 1.10	0.93	0.80 – 1.07
Justice	**0.82**	**0.71 – 0.95**	**0.81**	**0.69 – 0.94**
General health perception	**0.59**	**0.43 – 0.81**	**0.54**	**0.38 – 0.76**
Burnout and stress	**1.23**	**1.12 – 1.36**	**1.24**	**1.12 – 1.37**
Burnout	**1.39**	**1.16 – 1.65**	**1.41**	**1.17 – 1.69**
Stress	**1.42**	**1.20 – 1.36**	**1.41**	**1.18 – 1.68**
Offensive behavior	1.32	0.91 – 1.93	1.32	0.89 – 1.97

Model I: unadjusted; Model II: adjusted for gender, age, and type of work.
Significant associations are presented in bold.

DISCUSSION

The present study found associations between psychosocial factors and multisite pain among workers. The hypothesis was confirmed, as the results indicate significant associations between multisite pain and specific domains of the COPSOQ II. These findings are in line with data reported in other studies indicating that multisite pain is associated with psychosocial factors[10-19].

Multisite pain was associated with high demands at work, specifically with quantitative demands, work pace, and emotional demands. High work demand has been mentioned by other authors[12-16,18,31]. A recent meta-analysis of longitudinal cohort studies confirmed that job strain (i.e., high demand and low level of control) is a risk factor for musculoskeletal pain (risk ratio: 1.62; 95% CI: 1.22 to 2.15)[32]. Emotional demands were identified as a predictive factor for developing multisite pain across the four-year measurement period (OR: 1.38; 95% CI: 1.21 to 1.56) in a population of 5136 employees from the prospective cohort Study on Transitions in Employment, Ability and Motivation (STREAM) in the Netherlands[14].

Workers with multisite pain had less commitment to the workplace, less job satisfaction, a lower sense of justice, and less predictability. Authors[10,19] found that job satisfaction was a protective factor for multisite pain. Accordingly, an overview of systematic reviews found that low job satisfaction was associated with back pain[33]. Justice is an important human value in the workplace and has a considerable impact on worker well-being. Study[34] showed that lack of organizational justice is a source of stress and negative emotional reactions at work that can lead to health problems.

Work-family conflict was also associated with the outcome. Study[35] found a significant positive association between work-family conflict and lumbar/cervical pain. There was an association between work-private life conflict and the number of pain sites in a two-year prospective study[36]. Work-family conflict can be defined as an inter-role conflict, in which role pressures from work and family are not compatible[37]. This aspect is considered a potential source of stress and has negative effects on well-being. General health perception was also inversely associated with multisite pain. People with chronic widespread pain report having a poorer perception of their health status[38].

Burnout and stress were associated with multisite pain. These are the psychosocial aspects addressed most in the literature due to the greater negative impact on physical and mental health[39]. A systematic review of prospective studies showed a significant association between burnout and musculoskeletal disorders[40].

Another important result of the present study was that about 62% of workers had complaints of pain in more than two parts of the body, the most affected of which were the neck/shoulders (88%) and thoracic/lumbar region (90%). This finding agrees with data described in previous studies reporting the prevalence of multisite pain among different working populations[10,31,41,42].

A very relevant aspect of the present study was the high prevalence of multisite pain among workers. This underscores the importance of pain assessments to identify affected regions of the body and seek causes. Organizational interventions may be relevant to the management of multisite pain.

This study has some limitations that should be considered. The cross-sectional design does not enable establishing causal relationships between psychosocial factors and multisite pain. Other limitations are the different number of workers in each occupational group and the lack of assessments of somatization and sleep, which have been shown to be associated with multisite pain[10,17,43].

CONCLUSION

The present study identified associations between several psychosocial factors and multisite pain in workers, indicating that these factors could be considered in the multisite pain management.

AUTHORS' CONTRIBUTIONS

Beatriz Suelen Ferreira Faria
Statistical analysis, Research, Writing - Review and Editing
Josiane Sotrate Gonçalves
Statistical analysis, Conceptualization, Research, Methodology, Writing - Preparation of the original, Writing - Review and Editing
Tatiana de Oliveira Sato
Statistical analysis, Funding Acquisition, Conceptualization, Project Management, Methodology, Writing - Preparation of the Original, Writing - Review and Editing, Supervision

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