

Individual factors are associated with musculoskeletal pain and discomfort in workers from a beverage company

Fatores individuais estão associados à dor e desconforto musculoesquelético em trabalhadores de uma empresa de bebidas

Factores individuales se asocian con el dolor y el malestar musculoesquelético en trabajadores de una empresa de bebidas

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ABSTRACT | Work-related musculoskeletal disorders may be associated with several risk factors. This study objective was to analyze the association of occupational risk factors and individual factors with musculoskeletal pain/discomfort in workers who performed dynamic loading activities as well as static postural functions in a beverage company that offers ergonomics and workplace exercises program to all employees. Associations of age, time on the job, nonadherence to labor gymnastics, Work Ability Index (WAI), perception of fatigue by the Need For Recovery scale (NFR), physical and mental health, general health status by the Short Form-36 (SF-36) questionnaire, and pain by the Nordic pain map were analyzed using Fisher's exact test and logistic regression in a cross-sectional observational study with odds ratios (OR), 95%CI, $p < 0.05$. Of the 100 workers evaluated, 57% reported pain, with the low back pain being the most prevalent (47%). An association was found with back pain, being 10.45 times related to workability, 7.4 times for age, 10.25 times for physical aspects; 6.13 times for functioning; 5.17 for general health status; 4.96 for social functioning, and 3.01 for emotional well-being for the SF-36 domains. The need for rest was 3.40 times associated with the presence of pain, time in the job was 4.12 times associated, while absenteeism was 7.35 and nonadherence to workplace exercises was 2.95 times associated. This sample findings suggest that individual factors such as physical health care and psychosocial support, in addition to workplace exercises and breaks, could be relevant as a preventive approach to alleviate pain.

Keywords | Worker's Health; Musculoskeletal Pain; Risk Factors.

RESUMO | As desordens musculoesqueléticas relacionadas ao trabalho podem estar associadas a diversos fatores de risco. O objetivo deste estudo foi analisar a associação dos fatores de risco ocupacionais e os fatores individuais com dor/desconforto musculoesquelético em trabalhadores de uma empresa de bebidas que realizam atividades dinâmicas com carga e atividades estáticas de escritório, a qual oferece um programa de ergonomia e ginástica laboral. Foram analisados associação da idade, tempo na função, não adesão à ginástica laboral, Índice de Capacidade para o Trabalho (ICT), percepção de fadiga pela Escala de Necessidade de Descanso (ENEDE) e saúde física e mental, estado geral de saúde através do questionário SF-36 e dor pelo mapa de dor Nórdico. Utilizou-se o teste exato de Fisher e regressão logística em um estudo observacional transversal através de *odds ratios* (OR), 95% IC, $p < 0.05$. Dos 100 trabalhadores avaliados, 57% relataram dor, sendo a região lombar a mais prevalente (47%). Foi encontrada associação com a dor nas costas sendo 10,45 vezes relacionado à capacidade para o trabalho, 7,40 vezes para idade, 10,25 vezes para os aspectos físicos, 6,13 para a capacidade funcional, 5,17 para o estado geral de saúde, 4,96 para os aspectos sociais e 3,01 vezes para saúde mental para os subdomínios do SF-36. A necessidade de descanso esteve 3,40 vezes associada à presença da dor,

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ao tempo na função 4,12 vezes, ao absenteísmo 7,35 vezes e à não adesão à ginástica laboral 2,95 vezes. Os achados desta amostra sugerem que fatores individuais como cuidado com a saúde física, além do apoio psicossocial, ginástica laboral e pausas, podem ser relevantes como abordagem preventiva para controle das queixas de dor em trabalhadores.

Descritores | Saúde do Trabalhador; Dor Musculoesquelética; Fatores de Risco.

RESUMEN | Los trastornos musculoesqueléticos relacionados con el trabajo pueden asociarse con varios factores de riesgo. Este estudio tuvo el objetivo de analizar la asociación de factores de riesgo ocupacionales y factores individuales con dolor/malestar musculoesquelético en trabajadores de una empresa de bebidas que realizan actividades dinámicas con carga y actividades estáticas de oficina, que ofrece un programa de ergonomía y gimnástica laboral. Se analizaron la asociación de la edad, el tiempo de trabajo en la función, no adherir a la gimnástica laboral, el Índice de Capacidad para el Trabajo (ICT), la percepción de fatiga mediante la Escala de Necesidad de Descanso (ENEDE) y la salud física y mental,

el estado general de salud mediante el cuestionario SF-36 y el dolor mediante el mapa Nórdico de dolor. Se utilizó la prueba exacta de Fisher y la regresión logística en un estudio observacional transversal a través de *odds ratios* (OR), el 95% IC, $p < 0.05$. De los 100 trabajadores evaluados, el 57% relató dolor, siendo la región lumbar la más prevalente (el 47%). Se encontró una asociación con el dolor en la espalda, relacionándose 10.45 veces con la capacidad para el trabajo, 7.40 veces con la edad, 10.25 veces con los aspectos físicos, 6.13 veces con la capacidad funcional, 5.17 veces con el estado general de salud, 4.96 veces con los aspectos sociales y 3.01 veces con la salud mental para los subdominios del SF-36. La necesidad de descanso se asoció 3.40 veces con la presencia del dolor, 4.12 veces con el tiempo de trabajo en la función, 7.35 veces con el absentismo y 2.95 veces con no adherir a la gimnástica laboral. Los hallazgos de esta muestra sugieren que factores individuales como el cuidado con la salud física, además del apoyo psicossocial, la gimnástica laboral y los descansos, pueden ser relevantes como un enfoque preventivo para el control de las quejas de dolor en trabajadores.

Palabras clave | Salud del Trabajador; Dolor Musculoesquelético; Factores de Riesgo.

INTRODUCTION

Work-related musculoskeletal disorders can affect the neck, upper limbs, and lumbar spine^{1,2}. The development of musculoskeletal symptoms can be related with several risk factors, including individual/personal factors; organizational, cognitive or psychosocial factors, and/or physical or biomechanical factors³. All those risk factors could be associated with multifactorial components of the work-related musculoskeletal disorders. In addition, they need to be evaluated to plan prevention and monitoring programs for successive musculoskeletal disorders in the workplace, as a strategy for health promotion¹⁻³.

Musculoskeletal injury may occur when the physical overload is excessive or even when the physical capacity of the worker is reduced by individual or occupational factors⁴. Although technological advances and the development of new work tools have been made, musculoskeletal disorders are still prevalent in workplaces worldwide, causing high rates of absenteeism and disability³.

Pain and/or discomfort at work should be investigated, since a better understanding of its causal factors can support improvements in the occupational environment with a

consequent decrease in absenteeism rates, improvement in the work process and in workers' quality of life¹. Thus, ergonomic risk assessment is essential to provide favorable working conditions, as well as to improve productivity with a safe and healthy work environment⁴. Evidence-based quality of life at work programs aim to foster healthy environments by providing a diverse array of activities, such as workplace exercises, as a preventive action for workers' health. These activities, carried out during office hours in groups, voluntarily, in the work environment, intend to prevent and reduce musculoskeletal pains⁵.

This study is relevant in the general scope of workers' health, with a focus on checking the association of musculoskeletal pain complaints with individual, physical/biomechanical, psychosocial, cognitive and organizational risk factors.

Considering that investigations on beverage company workers are scarce in the literature, this study aimed to describe the prevalence of musculoskeletal pain and discomfort and to analyze its association with individual, physical/biomechanical, psychosocial, cognitive and organizational risk factors in a beverage company that offers workplace exercises as part of its quality of life program.

METHODOLOGY

Study design, sample and procedure

This was an observational and cross-sectional study of a convenience sample of workers from a beverage company. All company employees were invited to participate in the survey during the period from January 2018 to January 2020. Initially, the company had 1,429 employees, distributed in sectors such as production line (production, bottling), inventory, distribution, building maintenance (mechanics and electricians), sales, call center (telemarketing agents), administrative (human resources, legal and work safety), and medical outpatient (physical therapist, physicians, occupational nursing technicians, speech therapist, and physical educators), in addition to security, cleaning, and maintenance work at heights. During the data collection, there was a gradual reduction in the number of employees, falling to just over 1,000 active employees. A total of 100 employees agreed to participate in the study, in which any employee of the company could be included if they were not on sick leave during the collection period; this was the only exclusion criterion.

The employees of this beverage company performed the most diverse functions. A group of workers performed lifting, transporting, and handling loads (deliverers, assistants, porters, among others), with predominantly dynamic work, characterized by interchangeable postures with consequent alternation of contraction and relaxation of the muscles during a work cycle, and with predominantly manual labor, exposed to physical/biomechanical risk factors. Another group of workers performed functions of predominantly static work with isometric muscle contraction with static or sustained postures (administrative assistants, telemarketing agent, supervisors, among others). In addition to working conditions with physical demands such as posture maintenance, they also present psychosocial, cognitive, and organizational tasks, being exposed to these risk factors.

Of the 100 workers who agreed to participate in the study, 51% performed functions with static predominance, not involving lifting, transport, and handling of loads (24 telemarketing agents, eight administrative assistants, five occupational safety technicians, four analysts, three leaders of staff, two occupational nursing technicians, one speech therapist, one occupational physician, one forklift operator, one quality technician, and one supervisor).

On the other hand, 49% of the sample performed functions with predominant dynamic physical/biomechanical requirements, involving lifting, transport, and cargo handling (12 production line operators, 10 delivery assistants, nine delivery drivers, nine loading assistants, two mechanics, two technicians refrigeration, one electrician, one cleaning assistant, one event assistant, one bricklayer, and one warehouse assistant).

Written consent was obtained from all participants and the company. The volunteers answered the questionnaires at their workplace during their working day, in a single occasion, in a private room at the company outpatient clinic.

Outcome measurements

All participants were instructed to answer a sociodemographic questionnaire with questions regarding age, sex, lifestyle, and occupational factors. The following questionnaires were used: Medical Outcome Study 36-item Short Form (SF-36)⁶; Nordic Musculoskeletal Questionnaire⁷; Corlett's Body Map⁸; Work Ability Index (WAI)⁹; Need For Recovery scale (NFR)¹⁰, and Quick Exposure Check (QEC)¹¹.

The Medical Outcome Study 36-item Short Form (SF-36) is one of the most widely used questionnaires on generic measures of quality of life, since it is very sensitive to the individual's improvement. The questionnaire was designed with subjective subdomains within objective data, which can be administered in a specific, global, and reproducible way. The higher the score, the better the individual's quality of life¹².

The Nordic Musculoskeletal Questionnaire (NMQ) was developed to standardize the measurement of the reporting of musculoskeletal symptoms, and thus facilitate the comparison of results between studies⁷. The Corlett's Body Map was developed to map the presence of pain or discomfort perceived by workers⁸, thus helping to identify and locate painful areas. The authors developed a diagram subdividing the human body into several segments. The worker assesses their pain/discomfort in each area and classifies its intensity on a scale from 1 (no discomfort) to 5 (intolerable discomfort).

The Need For Recovery scale (NFR) is a scale from the Questionnaire on the Experience and Evaluation of Work that has been used to assess work-induced fatigue and the quality of recovery time¹³. The NFR assesses the short-term effects of work-induced fatigue, such as lack of attention, irritability, social withdrawal, reduced

performance, and the quality of recovery time after work. This scale is scored from 0 to 33 points, in which a higher score indicates greater work-induced fatigue¹⁰.

The Work Ability Index (WAI) is an instrument to assess work capacity from the worker's perception, with 10 questions distributed into seven dimensions. The results provide a measure of work capacity ranging from 7 to 49 points⁹.

The Quick Exposure Check (QEC) is an instrument to assess occupational risk factors. It covers 12 out of a total of 16 questions, distributed in two columns. The first column contains the observer's assessment, and the second column contains the worker's answers. The total combined score of the responses of the observer and the worker ranges from 46 to 269 points and can be classified into four categories of risk exposure: low, moderate, high, and very high¹¹.

Statistical analysis

Initially, to characterize the sample, a descriptive analysis of the data was performed. Fisher's exact test was used to assess the association between qualitative variables¹⁴. These associations were quantified using logistic regression models¹⁵, and the gross odds ratios and their respective 95% confidence intervals were estimated. All statistical analyses were performed using the SAS statistical software.

RESULTS

Socio-demographic data

There was a predominance of men in our sample (69%), with a mean age of 33.76 years (± 8.51 years). Body mass index (BMI) was within normality in 60% of the sample, with most being right-handed (95%). Time in the function varied from 8 months and 23 years. Among participants, 63% had no history of absenteeism, 59% did not practice physical activity, and 55% participated in regular workplace exercises.

In the Nordic Musculoskeletal Questionnaire, 57% of the sample reported musculoskeletal pain/discomfort. There was a high prevalence of pain/discomfort in the lumbar (43%), mostly reported as a complaint in the last 12 months, with greater impediment in performing activities, greater need to seek help from health professionals, and more complaints of pain/discomfort in the last seven days. Corlett's Body Map also showed

greater reports of pain/discomfort in the lumbar, mostly of moderate intensity (12%). No intolerable pain was reported by any participant.

The mean scores obtained from the SF-36 questionnaire (Table 1) were higher for the Functioning (88.00) and Social functioning (81.26) components, while Energy/fatigue (67.20) and emotional well-being (69.56) showed the lowest mean results.

Table 1. Values obtained for each component of the SF-36 questionnaire – Ribeirão Preto (SP), Brazil, 2020

Component	Mean	Standard Deviation	Min	Max
Physical functioning	88.00	14.72	35.50	98.50
Role functioning/physical	73.35	14.42	20.00	80.00
Pain	78.17	21.51	19.80	98.80
General Health	70.82	10.58	35.75	80.75
Energy/fatigue	67.40	18.76	8.80	88.80
Social functioning	81.26	22.14	0.00	98.75
Emotional well-being	70.25	20.52	0.00	80.00
Role functioning/emotional	69.56	17.72	18.80	94.80

Table 2 shows the results obtained for the WAI, NFR, and QEC questionnaires. The mean result for the WAI questionnaire was 36.92, indicating low work capacity. The mean result obtained for the NFR questionnaire was 12.29, classified as moderate after-work fatigue. The QEC presented a mean value of 126.82, which points to a moderate occupational risk of exposure to biomechanical, organizational, and psychosocial factors.

Table 2. Values obtained for the WAI, NFR, and QEC questionnaires – Ribeirão Preto (SP), Brazil, 2020

Questionnaire	Mean	Standard deviation	Min	Max
WAI	36.92	4.24	21.50	44.00
NFR	12.29	4.39	5.00	29.00
QEC	126.82	27.61	58.00	179.00

WAI: Work ability index; NFR: Need For Recovery scale; QEC: Quick Exposure Check

Fisher's exact test and logistic regression were performed to verify the association between the self-reported dependent variable "pain" with the items of the

sociodemographic questionnaire, the SF-36 subdomains (Figure 1), and the WAI, NFR, and QEC questionnaire results (Table 3). For the NFR analysis, it was necessary to

transform the three categories (low, moderate, and high) into two categories (low and moderate-high), due to the low number of scores (3) in the “high” subdivision.

Figure 1. Interval Plot (mean and 95% Confidence Interval) from domains of SF-36 questionnaire, related to pain – Ribeirão Preto (SP), Brazil

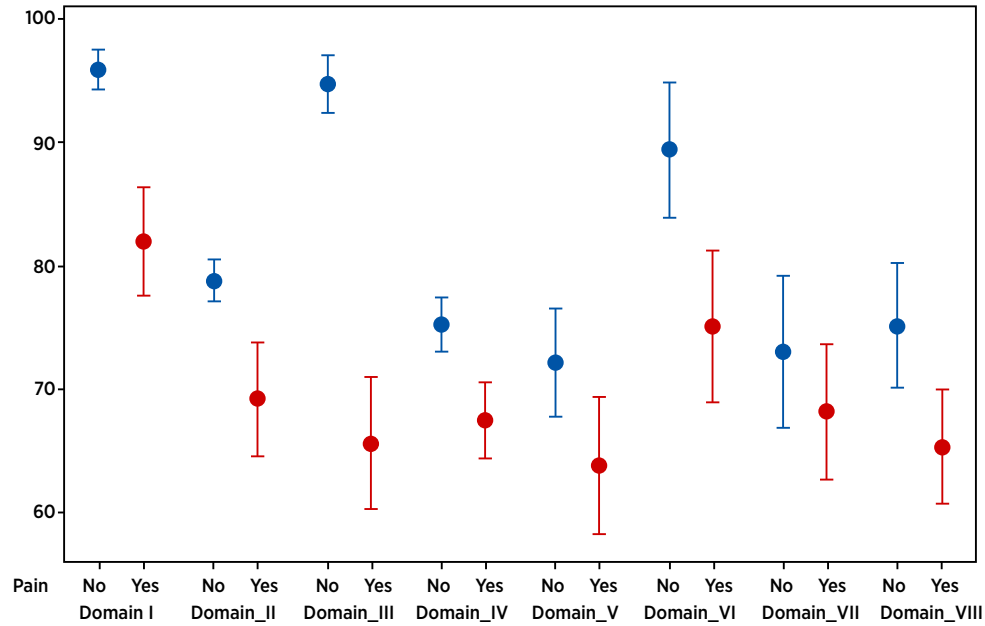


Table 3. Frequency, Fisher's exact test and logistic regression related to self-reported pain – Ribeirão Preto (SP), Brazil

	Pain		Total	p-value*	crude Odds Ratio (95%CI)
	No (43%)	Yes (57%)			
	n (%)	n (%)			
Age (years)					
below 30	25 (58.14)	18 (41.86)	43 (100.00)	0.006	1.00 (Reference)
30–40	15 (39.47)	23 (60.53)	38 (100.00)		2.13 (0.87; 5.18)
40–60	3 (15.79)	16 (84.21)	19 (100.00)		7.40 (1.87; 29.25)
Sex					
Male	31 (44.93)	38 (55.07)	69 (100.00)	0.663	1.00 (Reference)
Female	12 (38.71)	19 (61.29)	31 (100.00)		1.29 (0.54; 3.06)
Handedness					
Right-handed	41 (43.16)	54 (56.84)	95 (100.00)	1.000	1.00 (Reference)
Left-handed	2 (40.00)	3 (60.00)	5 (100.00)		1.13 (0.18; 7.13)
Load lifting					
Yes	18 (36.73)	31 (63.26)	49 (100.00)	0.233	1.65 (0.74; 3.68)
No	25 (49.02)	26 (50.98)	51 (100.00)		1.00 (Reference)
Time in function (years)					
Less than 2	21 (60.00)	14 (40.00)	35 (100.00)	0.021	1.00 (Reference)
2–5	14 (40.00)	21 (60.00)	35 (100.00)		2.25 (0.86; 5.85)
More than 5	8 (26.67)	22 (73.33)	30 (100.00)		4.12 (1.43; 11.84)

(continues)

Table 3. Continuation

	Pain		Total	p-value*	crude Odds Ratio (95%CI)
	No (43%)	Yes (57%)			
	n (%)	n (%)			
Absenteeism due to musculoskeletal diseases					
Yes	6 (16.22)	31 (83.78)	37 (100.00)	<0.001	7.35 (2.68; 20.14)
No	37 (58.73)	26 (41.27)	63 (100.00)		1.00 (Reference)
BMI					
Normal	30 (50.00)	30 (50.00)	60 (100.00)	0.153	1.00 (Reference)
Overweight	9 (37.50)	15 (62.50)	24 (100.00)		1.66 (0.63; 4.39)
Obesity	4 (25.00)	12 (75.00)	16 (100.00)		3.00 (0.86; 10.36)
Physical activity					
Yes	19 (46.34)	22 (53.66)	41 (100.00)	0.681	1.00 (Reference)
No	24 (40.67)	35 (59.32)	59 (100.00)		1.25 (0.56; 2.81)
Workplace exercises					
Yes	30 (54.54)	25 (45.46)	55 (100.00)	0.014	1.00 (Reference)
No	13 (28.89)	32 (71.11)	45 (100.00)		2.95 (1.28; 6.80)
SF-36 – Physical functioning					
< 93.5	7 (18.42)	31 (81.58)	38 (100.00)	<0.001	6.13 (2.34; 16.06)
≥ 93.5	36 (58.06)	26 (41.93)	62 (100.00)		1.00 (Reference)
SF-36 – Role limitation/ physical					
< 80	2 (9.52)	19 (90.48)	21 (100.00)	<0.001	10.25 (2.23; 46.97)
≥ 80	41 (51.90)	38 (48.10)	79 (100.00)		1.00 (Reference)
SF-36 – Pain					
< 82.8	1 (2.63)	37 (97.37)	38 (100.00)	<0.001	77.68 (9.93; 607.20)
≥ 82.8	42 (67.74)	20 (32.26)	62 (100.00)		1.00 (Reference)
SF-36 – General Health					
< 75.75	6 (18.75)	26 (81.25)	32 (100.00)	0.001	5.17 (1.88; 14.16)
≥ 75.75	37 (54.41)	31 (45.59)	68 (100.00)		1.00 (Reference)
SF-36 – Energy/fatigue					
< 73.8	17 (36.17)	30 (63.83)	47 (100.00)	0.227	1.69 (0.76; 3.79)
≥ 73.8	26 (49.06)	27 (50.94)	53 (100.00)		1.00 (Reference)
SF-36 – Social functioning					
< 86.25	7 (20.00)	28 (80.00)	35 (100.00)	<0.001	4.96 (1.89; 12.99)
≥ 86.25	36 (55.38)	29 (44.62)	65 (100.00)		1.00 (Reference)
SF-36 – Emotional well-being					
< 80	5 (23.81)	16 (76.19)	21 (100.00)	0.051	2.96 (0.99; 8.88)
≥ 80	38 (48.10)	41 (51.90)	79 (100.00)		1.00 (Reference)
SF-36 – Role limitations/emotional					
< 74.8	11 (27.50)	29 (72.50)	40 (100.00)	0.013	3.01 (1.27; 7.11)
≥ 74.8	32 (53.33)	28 (46.67)	60 (100.00)		1.00 (Reference)

(continues)

Table 3. Continuation

	Pain		Total	p-value*	crude Odds Ratio (95%CI)
	No (43%)	Yes (57%)			
	n (%)	n (%)			
WAI					
Reduced	5 (13.16)	33 (86.84)	38 (100.00)	<0.001	10.45 (3.58; 30.47)
Good	38 (61.29)	24 (38.71)	62 (100.00)		1.00 (Reference)
NFR					
Low	34 (53.12)	30 (46.88)	64 (100.00)	0.009	
Moderate	9 (27.27)	24 (72.73)	33 (100.00)		
High	0 (0.00)	3 (100.00)	3 (100.00)		
NFR					
Low	34 (53.12)	30 (46.88)	64 (100.00)	0.006	1.00 (Reference)
Moderate/High	9 (25.00)	27 (75.00)	36 (100.00)		3.40 (1.38; 8.36)
QEC					
Low	5 (62.50)	3 (37.50)	8 (100.00)	0.436	1.00 (Reference)
Moderate	23 (43.40)	30 (56.60)	53 (100.00)		2.17 (0.47; 10.04)
High	15 (38.46)	24 (61.54)	39 (100.00)		2.66 (0.55; 12.81)

WAI: Work ability index; NFR: Need For Recovery scale ; QEC: Quick Exposure Check

*p-value related to Fisher's exact test

DISCUSSION

Several factors were associated with the presence of musculoskeletal pain/discomfort, such as age over 40 years, time in function greater than 5 years, absenteeism due to musculoskeletal disease, non-adherence to workplace exercises, all domains of the SF-36 (except energy/fatigue and emotional well-being), incapacity for work, and the need for rest.

We identified low back as the area most affected by pain, based on the two body maps from the Nordic Musculoskeletal Questionnaire and Corlett's Body Map. Fatoye et al.¹⁶ stated that many factors, as age, sex, and work efforts can contribute to prevalence and incidence of low back pain. Those findings corroborated with our study in relation to individual factors.

The dynamic interaction between social, biological, and social factors (and not a single specific cause) predispose to lumbar spine injury. Hence, given its complexity, a multidisciplinary approach is necessary for treatment¹⁷.

In addition, we did not find significant differences in pain between workers who performed weightlifting functions and workers who did not, which may indicate that both situations can be harmful in the onset of low back pain¹⁸.

Although we still do not have a strong causal association between maintaining a sitting posture and low back pain, possibly due to its multifactorial causes, it has been verified that maintaining the same posture for long periods, performing fewer movements, and a more sedentary behavior at work may predispose to chronic low back pain^{19,20}.

Few studies have analyzed the prevalence of work-related musculoskeletal discomfort in beverage factories. Abaraogu et al.²¹ found a high prevalence of complaints in the shoulder, neck, and upper back, associated with age but not with sex, in a similar sample of beverage bottling workers. The high prevalence of shoulder pain found in this study can be explained by the repetitiveness of the tasks and the fact that workers at this company had tasks with upper limbs above shoulder level²¹.

Still regarding individual characteristics, we found that age and time in function were associated with pain complaints. With increasing age and time in function, the individual was more likely to have musculoskeletal pain/discomfort. From the age of 30, workers were 2.13 times more likely to experience pain/discomfort, and from the age of 40 odds increased to 7.40 times.

According to Abarago et al.²¹ the prevalence of musculoskeletal pain is higher with increasing age,

for both sexes. There is still a need for further prospective longitudinal cohort studies to justify this relation, which can possibly be explained by degenerative disorders of joints and muscles with age.

We also found that absenteeism due to musculoskeletal disease was a factor associated with pain complaints. Individuals reporting absenteeism were 7.35 times more likely to have pain than workers who did not. Workers who reported pain and work-related psychosocial factors were at 15–20 times higher risk of severance and/or retirement due to disability².

This data demonstrates the importance of verifying and correcting ergonomic factors that may predispose to musculoskeletal disorders at work, since, in addition to the pain-related damage to health and quality of life, absenteeism causes important socioeconomic damage¹⁷.

Another individual factor that was associated with pain was non-participation in the voluntary workplace exercise sessions. We found that workers who did not participate in these classes offered by the company had 2.95 times more complaints of musculoskeletal pain compared to workers who participated. A study by Giagio et al.⁵ have shown that workers who practiced supervised exercises at work had a decrease in the intensity and frequency of referred pain. Workplace exercises can benefit both the employee and the company. Regarding employees, there are physiological benefits; such as improving posture, muscle strength and endurance, motor coordination, concentration, well-being and quality of life; and reducing muscle tension. For the company, there are reduced healthcare costs and absenteeism rates, improvement in healthy habits, and reduction in work accidents. These programs consist of specific exercises performed during the workday, which act as preventive and therapeutic in different ways. They can be preparatory, by activating the muscles at the beginning of the day; compensatory, by stretching the muscles used at work during break times; or performed at the end of the day for mental and physical relaxation²². Despite lacking evidence on their effectiveness, promising results have been reported²³.

Regarding the SF-36 questionnaire, we found that the domains related to Physical Functioning, Role limitations/physical, Pain, General Health, Social functioning, and role limitations/emotional showed an association with complaints of musculoskeletal pain reported by workers in a beverage manufacturing company²⁴.

The occurrence of musculoskeletal pain has a negative impact on most of the factors for quality of life among this study participants, which is also confirmed by other studies^{25,26}.

A study conducted including fishermen with a high prevalence of musculoskeletal disorders, a lower quality of life was also measured using the SF-36. Lower scores were found, especially in the domains of role limitations/emotional and social functioning²⁴. These results agree with our findings, which also indicated an association between the presence of pain and the general health, social functioning, and role limitations/emotional domains. Thus, in addition to a preventive approach to musculoskeletal pain and discomfort, issues related to mental health and social support are also useful in improving the general quality of life of workers.

To study work capacity and the need for recovery between workdays, we used the WAI⁹ and NFR¹⁰. In both questionnaires, we found an association between pain and risk factors at work. Our study demonstrated that workers who reported pain had reduced rates of work capacity, as well as a moderate to high need for recovery. Therefore, the lower the WAI score, the greater the pain complaints and the lesser the ability to work. The study by Souza et al.⁹ also reported similar results in a sample of tertiary hospital employees.

Thus, conducting periodic routine examinations and early intervention in environmental and organizational factors at work may be important to prevent or reduce workers' musculoskeletal pain and improve quality of life²⁶.

In addition to the ability to work, personal characteristics, psychosocial factors, and quality of life are associated with the presence of pain in this study. Evidence indicates the presence of pain as an important predictor of worsening overall quality of life¹². A study have shown significant association between pain and the physical and the social domains²⁷.

Our outcomes are in line with the study by Skovlund et al²⁸. According to these authors, high physical demand was also associated with lower work ability in workers with musculoskeletal pain aged 18 to 59 years. Reducing the physical demands of work or increasing physical capacity (via physical exercise routines in the workplace) should be considered for the prevention or treatment of musculoskeletal pain²⁸.

Musculoskeletal disorders can impair their ability to cope and maintain health and independence, leading to a precipitous physical and social decline²⁹.

Regarding ergonomics aspects, we applied the QEC questionnaire, which presented a mean value of 126.82, indicating a moderate occupational risk for the volunteers. This result was not significantly associated with the dependent variable "pain"; however,

it is noteworthy that the data points to the important issue of ergonomics at work. When filling out this questionnaire, ergonomics is considered from the perspective of both the examiner and the worker. Adopting good ergonomic practices is one way to prevent occupational diseases. Furthermore, good ergonomic practices are essential for the company success, as they directly impact workers' quality of life²⁹.

This research reinforces the importance of preventing pain/discomfort related to risk factors at work, whether for workers carrying out dynamic or static activities.

Study limitations

This correlational exploratory study did not focus on ergonomics analysis by subgroups of occupations, which could generate additional findings. Further studies investigating larger samples of this population are necessary to corroborate our results.

CONCLUSIONS

The results demonstrate that the area most affected by pain in these workers was the lumbar region, both for functions that required lifting, transporting and handling loads, and for those that did not involve such activities.

We found that individual factors such as age over 40 years, time in the job for over 5 lumbar region, both for functions that required lifting, transporting and handling loads, and for those that did not involve such activities.

From the low scores presented in the domains of mental health and social aspects and their association with pain, we concluded that psychosocial factors also contributed to the appearance of musculoskeletal pain in these workers. As well as physical factors, through the low scores presented in the domains of physical aspects, work ability and moderate-high need for post-work recovery and its association with pain.

We suggest that the treatment of musculoskeletal pain can reduce such risk factors at work positively impacting physical, mental and social health, generating a better quality of life and better ability to work in the studied population.

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