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Perception of the ergonomic climate of the company and the presence of musculoskeletal discomfort in workers*

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Abstract

Objective: To estimate the relationship between the perception of the ergonomic climate of the company and the presence of musculoskeletal discomfort in workers in three Colombian cities.
Methodology: Survey of 1339 workers in companies of different economic sectors, located in Barranquilla, Bogota and Cucuta. The study was conducted from September to December 2021. The Ergonomic Climate Evaluation Questionnaire and the Nordic Musculoskeletal Questionnaire for the evaluation of musculoskeletal discomfort were applied.
Results: Most of the discomfort was in the neck (48.88 %). 48.69 % of the workers surveyed considered that their training and knowledge about wellness and health in the work environment was low. The perception of musculoskeletal discomfort in the neck was higher in workers with low perception of Management's commitment to business indicators [OR 1.77 (IC 95 %: 1.24-2.51)] and to well-being and health [OR 2.56 (IC 95 %: 1.75-3.75)]. Low employee training and knowledge of business indicators was related to greater discomfort in shoulders [OR 1.8 (IC 95 %: 1.26-2.58)] and elbows [OR 2.3 (IC 95 %: 1.38-3.62)], and on well-being and health, with discomfort in the upper back [OR 3.7 (IC 95 %: 2.60-5.25)], hips, buttocks, thighs [OR 3.19 (IC 95 %: 2.19-4.66)] and knees [OR 4.42 (IC 95 %: 3.02-6.46)].
Conclusion: The presence of musculoskeletal discomfort is related to the company's lack of commitment to the management of a healthy environment, the participation of workers in occupational health and safety activities, occupational risk analysis and worker training processes.

----------*Key words:* ergonomic climate, musculoskeletal pain, ergonomics, occupational safety and health

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Percepción del clima ergonómico de la empresa y la presencia de molestias musculoesqueléticas en trabajadores

Resumen

Objetivo: Estimar la relación entre la percepción del clima ergonómico de la empresa y la presencia de molestias musculoesqueléticas en trabajadores de tres ciudades colombianas.
Metodología: Estudio de corte en 1339 trabajadores de empresas de diversos sectores económicos, ubicadas en Barranquilla, Bogotá y Cúcuta. El estudio se realizó desde septiembre hasta diciembre de 2021. Se aplicaron el Cuestionario Evaluación del Clima Ergonómico y el Cuestionario Nórdico Musculoesquelético para la evaluación de molestias musculoesqueléticas.
Resultados: La mayoría de las molestias fueron en el cuello (48,88 %). El 48,69 % de los trabajadores encuestados considera que su formación y conocimiento sobre bienestar y salud en el ámbito laboral es baja. La percepción de molestias musculoesqueléticas en el cuello fue mayor en los trabajadores con baja percepción del compromiso de la Gerencia con los indicadores empresariales [OR 1,77 (IC 95 %: 1,24-2,51)] y con el bienestar y la salud [OR 2,56 (IC 95 %: 1,75-3,75)]. La baja formación y conocimiento de los empleados sobre los indicadores empresariales se relacionó con mayores molestias en hombros [OR 1,8 (IC 95 %: 1,26-2,58)] y codos [OR 2,3 (IC 95 %: 1,38-3,62)], y sobre el bienestar y la salud, con molestias en zona alta de la espalda [OR 3,7 (IC 95 %: 2,60-5,25)], cadera, nalgas, muslos [OR 3,19 (IC 95 %: 2,19-4,66)] y rodillas [OR 4,42 (IC 95 %: 3,02-6,46)].
Conclusión: La presencia de molestias musculoesqueléticas está relacionada con la falta de compromiso de la empresa con la gestión de un ambiente saludable, la participación de los trabajadores en las actividades de seguridad y salud en el trabajo, el análisis de riesgos laborales y los procesos de formación de los trabajadores.

----------*Palabras clave:* clima ergonómico, dolor musculoesquelético, ergonomía, seguridad y salud en el trabajo

Percepção do clima ergonômico da empresa e presença de desconforto musculoesquelético entre os trabalhadores

Resumo

Objetivo: Estimar a relação entre a percepção do clima ergonômico da empresa e a presença de desconforto musculoesquelético em trabalhadores de três cidades colombianas.
Metodologia: estudo amostral com 1339 trabalhadores de empresas de diferentes setores econômicos, localizadas em Barranquilla, Bogotá e Cúcuta. O estudo foi realizado de setembro a dezembro de 2021. Foram aplicados o Ergonomic Climate Evaluation Questionnaire e o Nordic Musculoskeletal Questionnaire para a avaliação do desconforto musculoesquelético.
Resultados: a maioria das queixas foi no pescoço (48,88%). 48,69% dos trabalhadores pesquisados consideraram que sua educação e conhecimento sobre bem-estar e saúde no trabalho eram baixos. A percepção de desconforto musculoesquelético no pescoço foi maior nos funcionários com baixa percepção do compromisso da gerência com os indicadores de negócios [ou 1,77 (ic 95%: 1,24-2,51)] e com a saúde e o bem-estar [ou 2,56 (ic 95%: 1,75-3,75)]. O baixo nível de treinamento e conhecimento dos funcionários sobre indicadores de negócios foi associado a um maior desconforto nos ombros [ou 1,8 (ic 95 %: 1,26-2,58)] e cotovelos [ou 2,3 (ic 95 %: 1,38-3,62)], e em bem-estar e saúde, com desconforto na parte superior das costas [ou 3,7 (ic 95%: 2,60-5,25)], quadris, nádegas, coxas [ou 3,19 (ic 95%: 2,19-4,66)] e joelhos [ou 4,42 (ic 95%: 3,02-6,46)].
Conclusão: A presença de desconforto musculoesquelético está relacionada à falta de comprometimento da empresa com a gestão de um ambiente saudável, à participação dos trabalhadores nas atividades de saúde e segurança ocupacional, à análise de riscos ocupacionais e aos processos de treinamento dos trabalhadores.

----------*Palavras-chave:* clima ergonômico, dor musculoesquelética, ergonomia, saúde e segurança ocupacional, saúde e segurança ocupacional.

Introduction

In the workplace, ergonomics emerges as a crucial factor to enhance well-being and optimize the overall performance of work systems [1]. The lack of ergonomic interventions, both at micro and macro levels, results in a significant deterioration of quality of life, the presence of diseases related to the musculoskeletal system and the alteration of productivity in organizations [2].

Currently, there is a debate of considerable relevance in the field of ergonomics, focused on the ergonomic climate, which is intrinsically linked to the level of commitment that an organization assumes regarding the integration of ergonomic principles with the aim of maximizing both operational performance and well-being results. In this study, "ergonomic climate" refers to employees' perceptions of organizations' support in designing and modifying work to maximize worker performance, productivity, and well-being (Hoffmeister *et al.* , 2015). This concept includes four main components or subscales: 1) the company's commitment to managing a healthy environment, 2) the participation of workers in occupational health and safety activities, 3) the analysis of occupational risks, and 4) the training processes of workers. This assessment enables employees to discern the atmosphere and the work environment in which they perform their duties, giving them a clear perception of the conditions that influence their job performance [3,4].

Previous studies have found that poor quality of work life has a negative influence on employee motivation and performance, which has unfavorable consequences on productivity, satisfaction, commitment, quality and worker well-being [5]. When the ergonomic climate of the company is affected by poor management of the administration to achieve a safe and healthy environment, and there is a low registration of risks - which, if carried out, helps to implement change interventions - there is an increase in work accidents and occupational diseases [6].

Thus, several authors [7-9] have highlighted that work activities impose a high demand on workers, often with limited resources, and require extensive development of skills, training, perception of priorities and other attributes that directly affect workers' coping capacity. This challenge can be intensified by exposure to stressors; therefore, the lack of timely control over health problems can manifest itself over time in processes of job burnout, reflected in dissatisfaction with work activity, interpersonal problems in the work environment, lack of motivation, musculoskeletal discomfort and a notable decrease in productive performance.

The absence of ergonomics in the work environment emerges as the main trigger of musculoskeletal diseases [10,11], becoming a serious public health problem. This challenge not only stands out for its high incidence and prevalence, but also for the decrease in functional capacity that it implies, and its economic impact on the health system, as well as on the quality of life of those who suffer from these conditions [12]. Globally, work-related diseases with a long latency period are increasing [13]. According to a recent study, these health problems represent the second cause of disability, contributing to 16% of potentially lost years of life [14].

The relationship between ergonomic climate and musculoskeletal complaints lies in how a well-designed and managed work environment can reduce physical and mental strains on workers. A positive ergonomic climate involves proper management of ergonomics, which reduces exposure to long working hours and the incidence of incorrect postures, repetitive movements and excessive physical efforts, all factors that contribute to the occurrence of musculoskeletal complaints [15].

To date, the literature linking ergonomic climate to musculoskeletal complaints is limited. Authors such as Hoffmeister *et al.* [4] highlight the crucial importance of simultaneously fostering a climate conducive to both performance and well-being. This comprehensive perspective translates into the promotion of a systemic approach, a practice frequently used in the field of ergonomics to demonstrate, in a holistic manner, the values associated with performance and work comfort [16].

The objective of this study was to estimate the relationship between ergonomic climate and musculoskeletal discomfort in workers from different economic sectors and several companies in the cities of Barranquilla, Bogotá and Cúcuta.

Method

Cutting study was carried out , following the guidelines of the STROBE DECLARATION (Strengthening the Reporting of Observational Studies in Epidemiology).

Participants

They participated 1,339 workers from 40 companies in the secondary (industrial, construction and energy) and tertiary (health, commercial, educational, transport, communications, public administration) sectors in the cities of Barranquilla, Bogotá and Cúcuta.

The sample was calculated from the total population of all companies (N = 41,900), with a 95% confidence interval (95% CI), a statistical power of 80% and a margin of error of 5%.

The inclusion criteria were workers from the 40 companies who were formally hired and over 18 years of age; people with cognitive disabilities were excluded.

The study was conducted from September to December 2021.

The sampling was probabilistic and random, based on the lists provided by the different human talent offices of the companies. The selection of the number of workers was proportional to the total population of each company.

The companies were selected from the list of contacts of the researchers. In these companies, the researchers carry out occupational health and safety activities within the framework of the Occupational Health and Safety Management System. They voluntarily agreed to participate in the study in the course of epidemiological surveillance.

Procedure

Permission was requested from each of the companies where the research was conducted. The survey was administered by direct interview, with prior informed consent from the participating workers.

The approach to the individuals was made during working hours, in time slots previously arranged with them, or during the break time that each one takes.

The objectives of the project and the procedure envisaged in it were cordially explained. Six researchers collected the information.

A survey was applied that measured the following sociodemographic variables: sex, age, socioeconomic status and educational level. The survey also inquired about the work characteristics of the participants, which included questions about the name of the company, the type of position (operational, administrative and managerial), years of seniority and the number of days of absenteeism from work.

The Nordic Questionnaire was also applied Ilkka 's Musculoskeletal System Kourinka *et al.* [17], used for the detection and analysis of musculoskeletal discomfort, applicable in ergonomic and occupational health studies contexts. It measures discomfort in 9 body areas: neck, shoulders, upper back, elbows, wrists/hands, lower back, hips/thighs, knees and ankles/feet. Musculoskeletal discomfort, problems or pain during the last 12 months and 7 days prior to the study were taken into account. In addition, it inquires about the change of job in the last 12 months. The questionnaire has shown a reliability through a Cronbach's alpha of 0.863 [18].

To measure the ergonomic climate, the Ergonomic Climate Evaluation Questionnaire, designed by Hoffmeister, was applied. *et al.* [4], which measures the four components or subscales of the ergonomic climate already stated: 1) the company's commitment to managing a healthy environment, 2) the participation of workers in occupational health and safety activities, 3) the analysis of occupational risks, and 4) the training processes of participating workers. The response options use a Likert scale: totally disagree, disagree, neutral, agree, and totally agree [4].

The questionnaire was provided by Faez *et al.* [3], who in their reliability study reported values of 0.94 for relevant content validity and 0.90 for essential content validity; also, an internal consistency of 0.96.

The format was translated into Spanish. Back-translation and cultural adaptation were then carried out, and it was evaluated through a pilot test on 25 people. All of these activities were developed by the researchers.

Statistical analysis

For data analysis, the statistical program SPSS ® (IBM ®) version 24, licensed by Simón Bolívar University, was used. Univariate and bivariate statistical analyses of the data were performed .

Categorical variables are presented in absolute and relative frequencies, and for quantitative variables, the mean and standard deviation are used.

A multivariate logistic regression was performed to estimate the relationship between the perception of musculoskeletal discomfort for each segment and the ergonomic climate indicators. The crude *odds ratio* (or) adjusted for sociodemographic and occupational variables (sex, age range, educational level and years of seniority) and their respective 95% CI were calculated , with a statistical significance level of 0.05.

Ethical aspects

In accordance with Resolution 008430 of October 4, 1993 and its article 11 [19], the present investigation is classified as without minimal risk, because the research techniques and methods used were questionnaires and surveys.

Likewise, the ethical principles for biomedical research on human beings, established in the Declaration of Helsinki [20], were followed.

The study was reviewed and approved by the Ethics Committee of Simón Bolívar University, according to Acta cei - usb - ce -0358-00-00 of December 1, 2020.

Results

Table 1 presents the sociodemographic and occupational characteristics of the participating workers. There is a greater representation of the female sex, with 50.93%; workers between 29 and 59 years old (64.82%), and from a low socioeconomic stratum (87.98%). There were fewer participants with a high educational level, professional education and postgraduate studies, represented at 47.05%.

Regarding job characteristics, most of the participants work in companies in the tertiary economic sector

Table 1. Sociodemographic and occupational characteristics of participating workers

Sociodemographic and occupational characteristics		Frequency	Percentage (%)
Sex	Female	657	49.07
	Male	682	50.93
Age range	Between 18 and 28 years old	450	33.61
	Between 29 and 59 years old	868	64.82
	Over 60 years old	21	1.57
Socioeconomic stratum	Low stratum*	1178	87.98
	High stratum	161	12.02
Educational level**	Low	709	52.95
	High	630	47.05
Economic sector of the company	Secondary sector	120	8.96
	Tertiary sector	1219	91.04
City where the company is located	Barranquilla	1057	78.94
	Bogota	187	13.97
	Cúcuta	95	7.09
Type of position	Operational	789	58.92
	Administrative	474	35.40
	Executive	76	5.68
Years old	Less than 1 year	293	21.88
	Between 1 and 5 years	658	49.14
	More than 5 years	388	28.98
		Media (OF)	Lower limit-upper limit
Age		34.04 (9.69)	18-66 years
Days of absenteeism from work in the last year		2.52 (6.79)	0-183 days

* According to the stratification in Colombia, strata 1 and 2 are considered low.

** The educational level is specified as follows: low: preschool, primary, secondary and middle school; high: higher education (technical, technological and professional) and postgraduate

(91.04%), located in Barranquilla (78.94%); the most frequent position was operational, with 58.92%; 49.14% of the workers have been working in the participating company for between 1 and 5 years, and there are fewer people with less than 1 year of seniority (21.88%). The average age was 34.04 ± 9.69 years, and with respect to days of absenteeism from work in the last year, the average was 2.52 ± 6.79 days.

Table 2 shows that the most common body segment with discomfort in the last 12 months was the neck, at 48.88%. Likewise, 41.07% of workers reported discomfort in the lumbar region, and 35.10% in the shoulders. Fewer people perceived discomfort in the elbows (14.78%).

Regarding the perception of an ergonomic climate that strengthens business indicators, Table 3 shows that the two factors with the greatest disagreement in their compliance were participation (47.42%), and employee training and knowledge on well-being and health issues (47.27%). 48.69% of the workers surveyed consider that their training and knowledge on this subject, in the workplace, is low; in this same sense, 47.12% estimate that their participation in activities and decision-making for the well-being and health of workers is low.

The factors that make up the ergonomic climate that most influence the perception of musculoskeletal discomfort in the neck were the commitment of Ma-

Table 2. Identification of musculoskeletal complaints prevalent in workers

Discomfort in the last 12 months	Frequency	Percentage (%)
Neck	654	48.88
Shoulders	470	35.10
Elbows	198	14.78
Dolls-hands	400	29.87
Upper back area	496	37.04
Lower back area	550	41.07
Hip, buttocks, thighs	315	23.52
Knees	320	23.89
Feet, ankles	332	24.79

Table 3. Perception of an ergonomic climate that strengthens business indicators and the well-being and health of workers in the work environment

Factors	Disagree n (%)	OK n (%)
Management commitment to business indicators	592 (44.21)	747 (55.79)
Employee engagement with business indicators	635 (47.42)	704 (52.58)
Identification and control of occupational risks with business indicators	625 (46.68)	714 (53.32)
Training and awareness of employees with business indicators	633 (47.27)	706 (52.73)
Management Commitment to Wellness and Health	594 (44.36)	745 (55.64)
Employee Engagement for Wellness and Health	631 (47.12)	708 (52.88)
Identification and control of occupational risks for well-being and health	596 (44.51)	743 (55.49)
Employee training and awareness for well-being and health	652 (48.69)	687 (51.31)

nagement to business indicators [OR 1.77 (95% CI : 1.24-2.51)] . This relationship was maintained in the adjustment for sex, age range, educational level and years of seniority [OR 1.59 (95% CI : 1.10-2.30)]. On the shoulders, the training and knowledge of employees with business indicators [OR 1.8 (95% CI : 1.26-2.58)] was the variable that did not change when making the adjustment. Elbow discomfort is related to the low perception that workers have in the training processes and knowledge of employees with business indicators [OR 2.3 (95% CI : 1.38-3.62)], probability that does not decrease when adjusting for the variables mentioned [OR 2.08 (95% CI : 1.26–3.42)] (see Table 4).

Management's commitment to the well-being and health of workers [OR 2.56 (95% CI : 1.75-3.75)] was a factor that influences the perception of neck discomfort; this relationship decreases slightly when adjusting for variables such as sex, age range, educational level and years of seniority [OR 2.06 (95% CI : 1.39-3.05)]. These results are similar in segments such as the lower back and in feet and ankles; the raw and adjusted ORs are different [OR 2.24 (95% CI : 1.44-3.50) vs. OR 1.96 (95% CI : 1.24–3.10)] (see Table 5).

Discussion

Musculoskeletal disorders are the leading cause of absenteeism worldwide. According to data revealed by the World Health Organization, a shocking number, approximately 1.71 billion people, are affected by these disorders, with low back pain being the most frequent symptom, affecting 568 million individuals. These musculoskeletal disorders stand out as the main source of disability on a global scale, with low back pain standing out as the most prevalent cause of disability in 160 countries [21].

This is consistent with the results obtained in the present study, taking into account that a representative sample of workers expressed musculoskeletal discomfort in various anatomical regions. The findings revealed a significant prevalence in the neck (48.8%),

Table 4. Relationship between ergonomic climate (business indicators) and the presence of musculoskeletal discomfort

Body segments [OR (IC 95 %) crude and adjusted*]			Management commitment to business indicators	Employee engagement with business indicators	Identification and control of occupational risks with business indicators	Training and awareness of employees with business indicators
	Neck	ORC	1.77 (1.24-2.51)	1.49 (1.10-2.09)	0.73 (0.50-1.07)	1.00 (0.712-1.41)
		NOW	1.59 (1.10-2.30)	1.29 (0.91-1.83)	0.76 (0.51-1.12)	0.97 (0.68-1.39)
	Shoulders	ORC	0.98 (0.68-1.41)	0.99 (0.69-1.41)	0.89 (0.61-1.31)	1.80 (1.26-2.58)
		NOW	0.89 (0.61-1.30)	0.90 (0.62-1.29)	0.89 (0.60-1.32)	1.81 (1.25-2.62)
	Elbows	ORC	1.96 (1.20-3.19)	0.63 (0.39-1.03)	0.70 (0.42-1.18)	2.23 (1.38-3.62)
		NOW	1.81 (1.10-2.98)	0.58 (0.35-0.95)	0.70 (0.41-1.19)	2.08 (1.26-3.42)
	Dolls and hands	ORC	1.46 (0.99-2.14)	0.94 (0.65-1.36)	0.570 (0.38-0.85)	1,392 (0.95-2.02)
		NOW	1.33 (0.89-1.98)	0.94 (0.64-1.37)	0.57 (0.38-0.88)	1.61 (1.09-2.37)
	Upper back area	ORC	1.08 (0.75-1.56)	0.68 (0.48-0.98)	1.37 (0.93-2.00)	1.20 (0.85-1.71)
		NOW	1.01 (0.70-1.47)	0.64 (0.44-0.92)	1.39 (0.94-2.05)	1.24 (0.86-1.78)
	Lower back area	ORC	1.14 (0.80-1.62)	0.86 (0.61-1.21)	0.94 (0.65-1.37)	1.23 (0.87-1.74)
		NOW	1.09 (0.76-1.56)	0.83 (0.58-1.17)	0.91 (0.62-1.33)	1.28 (0.90-1.82)
	Hip, buttocks, thighs	ORC	1.89 (1.24-2.88)	0.70 (0.46-1.04)	0.52 (0.33-0.81)	1.14 (0.76-1.71)
		NOW	1.77 (1.15-2.73)	0.65 (0.43-0.99)	0.49 (0.31-0.77)	1.18 (0.78-1.80)
	Knees	ORC	1.15 (0.76-1.73)	0.67 (0.45-1.00)	1.04 (0.68-1.59)	1.24 (0.84-1.85)
		NOW	1.09 (0.72-1.65)	0.65 (0.43-0.98)	1.05 (0.68-1.62)	1.33 (0.88-1.99)
	Feet, ankles	ORC	1.68 (1.11-2.53)	0.90 (0.60-1.33)	0.68 (0.44-1.05)	0.86 (0.58-1.28)
		NOW	1.60 (1.05-2.43)	0.84 (0.56-1.26)	0.63 (0.40-0.99)	0.91 (0.60-1.37)

ORC : crude OR (95% CI); ORA : adjusted OR (95% CI).
* OR adjusted for the variables sex, age range, educational level and years of seniority.

Table 5. Relationship between ergonomic climate (indicators for well-being and health) and the presence of musculoskeletal discomfort

Body segments [OR (95% CI crude and adjusted*]			Management Commitment to Wellness and Health	Employee Engagement for Wellness and Health	Employee Engagement for Wellness and Health	Employee Engagement for Wellness and Health
	Neck	orc	2.56 (1.75-3.75)	1.52 (1.10-2.12)	0.81 (.56-1.17)	0.65 (0.47-0.91)
		now	2.06 (1.39-3.05)	1.55 (1.10-2.18)	0.74 (0.51-1.09)	0.074 (0.52-1.04)
	Shoulders	orc	1.32 (0.90-1.94)	1.40 (1.10-1.97)	0.80 (0.55-1.16)	1.18 (0.84-1.66)
		now	1.10 (0.74-1.63)	1.44 (1.02-2.04)	0.74 (0.51-1.09)	1.18 (0.84-1.66)
	Elbows	orc	2.17 (1.30-3.61)	2.03 (1.29-3.19)	0.65 (0.39-1.09)	0.58 (0.36-0.92)
		now	1.83 (1.08-3.11)	1.99 (1.25-3.18)	0.058 (0.34-0.98)	0.65 (0.39-1.06)
	Dolls and hands	orc	1.75 (1.16-2.64)	0.98 0(.68-1.42)	0.33 (0.21-0.49)	2.25 (1.58-3.20)
		now	1.66 (1.08-2.53)	1.06 (0.73-1.54)	0.34 (0.22-0.51)	2.26 (1.58-3.24)
	Upper back area	orc	1.07 (0.72-1.59)	0.88 0(.62-1.26)	0.42 (0.28-0.63)	3.70 (2.60-5.25)
		now	0.94 (0.62-1.40)	0.90 (0.63-1.29)	0.40 (0.27-0.60)	3.98 (2.78-5.70)

			Management Commitment to Wellness and Health	Employee Engagement for Wellness and Health	Employee Engagement for Wellness and Health	Employee Engagement for Wellness and Health
	Lower back area	orc	1.55 (1.06-2.27)	0.76 (0.54-1.08)	0.50 (0.34-0.72)	2.20 (1.58-3.06)
		now	1.40 (0.95-2.07)	0.79 (0.56-1.11)	0.48 (0.33-0.713)	2.28 (1.63-3.19)
	Hip, buttocks, thighs	orc	2.31 (1.47-3.64)	0.92 (0.62-1.38)	0.15 (0.09-0.24)	3.19 (2.19-4.66)
		now	2.04 (1.28-3.26)	0.93 (0.61-1.40)	0.13 (0.08-0.21)	3.73 (2.52-5.54)
	Knees	orc	1.32 (0.84-2.06)	0.81 (0.54-1.21)	0.26 (0.16-0.40)	4.42 (3.02-6.46)
		now	1.22 (0.78-1.93)	0.82 (0.55-1.24)	0.25 (0.16-0.40)	4.69 (3.18-6.92)
	Feet, ankles	orc	2.24 (1.44-3.50)	0.75 (0.50-1.13)	0.21 (0.13-0.33)	3.43 (2.36-4.99)
		now	1.96 (1.24-3.10)	0.81 (0.54-1.22)	0.18 (0.11-0.29)	3.77 (2.56-5.55)

ORC : crude OR (95% CI); ORA : adjusted OR (95% CI).
* OR adjusted for the variables sex, age range, educational level and years of seniority.

followed by the lower back (41.1%), upper back (37.0%), shoulder (35.1%), wrists and hands (29.9%), feet and ankles (24.8%), knees (23.9%), hips, buttocks and thighs (23.5%) and elbows (14.8%). This set of data is also consistent with previous research, specifically with the reports of Cieza *et al.* [22], who observed 62% of musculoskeletal discomfort, 79% of neck pain, 47% of low back pain and 43% of other injuries.

Ramírez, Cantos and Molina [23] argue that the social and material conditions in which work is performed can have a negative impact on the well-being of individuals. This influence is aggravated by the specific conditions of work, both in material and organizational terms. However, this impact is conditioned by aspects existing in the work environment, characterized by their intensity and frequency, as well as by personal factors that affect individual susceptibility. One of these aspects is repetitive movements, accompanied by the concentration of mechanical forces, excessive efforts, inadequate postures that include movements outside the comfort angle, exposure to vibrations and the presence of cold in the work environment emerge as the main risk factors that trigger musculoskeletal discomfort [23].

Regarding the ergonomic climate, this study found that the two factors with the highest level of disagreement in their compliance by employees are participation (47.42%) and the training and knowledge they have (47.27%). In addition, it is evident that 48.69% of the surveyed workers consider that their training and knowledge about well-being and health in the workplace is low. In this same sense, 47.12% believe that their participation in activities and decision-making for the well-being and health of workers is low. These findings coincide with what has been reported by some authors [24,25], who identified a state of nonconformity and dissatisfaction of workers, due to the lack of participation in the different decision-making processes that could contribute to management strategies and training plans, and that favor the safety and health of the work community.

In the present study, a low percentage of training and knowledge on well-being and health in the workplace was also observed. This result is in line with the perspective of Benavides *et al.* [26], who highlight the significant contribution of well-being and occupational health in the creation of a decent and quality labour market. Occupational health, by improving working conditions and promoting the health of workers, plays a crucial role in preventing injuries, illnesses and disabilities.

However, some organizations seem to lack effective strategies to mitigate work disability, whether temporary or permanent, and whether occupational or common. This negatively impacts the ability of workers, resulting in the imperative need to specifically address the promotion of employee participation and training to strengthen the ergonomic climate in the company. This critical aspect deserves careful attention from organizations, as it has direct implications on health and work performance [25].

It could be observed that Ergonomic climate is related to the presence of musculoskeletal discomfort. Regarding management commitment to business indicators, a positive relationship was found with discomfort in the neck (OR : 2.56; 95% CI : 1.75-3.75), elbows (OR : 2.17; 95% CI : 1.30-3.61), wrists and hands (OR : 1.75; 95 % CI: 1.16-2.64), hips, buttocks and thighs (OR : 2.31; 95% CI: 1.47-3.64), and feet and ankles (OR : 2.24; 95% CI : 1.44-3.50). On the other hand, employee participation in well-being and health was significantly associated with a higher likelihood of neck (OR : 1.52; 95% CI : 1.10-2.12), shoulder (OR : 1.40; 95% CI: 1.10-1.97) and elbow (OR : 2.03; 95% CI :

1.29-3.19) DISCOMFORT. Regarding employee training and knowledge, a positive relationship was observed with discomfort in the wrists and hands (OR : 2.25; 95% CI : 1.58-3.20), upper back (OR : 3.70; 95% CI: 2.60-5.25), lower back (OR : 2.20; 95% CI : 1.58-3.06), hips, buttocks and thighs (OR : 3.19 ; 95% CI : 2.19-4.64), knees (OR : 4.42; 95% CI : 3.02-,6.46) and feet and ankles (OR : 3.43; 95% CI : 2.36-4.99) .

Faez 's research. *et al.* [3], where it was noted that the ergonomic climate score showed a significant difference between the group of employees who reported musculoskeletal pain and those who did not. This comparison highlights the crucial importance of promoting an ergonomic work environment to attenuate the incidence of musculoskeletal discomfort, evidencing the need to implement strategies that promote well-being and health in the workplace.

Specifically, management commitment to business indicators was found to significantly influence the occurrence of neck discomfort, with an adjusted OR of 1.59 (95% CI : 1.10-2.30), highlighting the importance of effective and conscious management of the work environment to reduce neck discomfort. Likewise, employee training and knowledge regarding business indicators showed a strong association with shoulder (adjusted OR 1.81, 95% CI : 1.25-2.62) and elbow (adjusted OR 2.08, 95% CI : 1.26-3.42) discomfort, highlighting the need to improve educational and training strategies within companies.

These findings are consistent with previous studies that have pointed to the importance of ergonomic climate in preventing musculoskeletal disorders. Hoffmeister *et al.* suggest that a well-designed and managed work environment can significantly reduce physical and mental strains on workers [4]. In agreement, Faez *et al.* found that a positive evaluation of the ergonomic climate is associated with lower incidences of musculoskeletal pain, highlighting the relevance of these factors in the safety and health of workers [3].

This study has certain limitations, such as the cross-sectional nature of the design, which prevents establishing causality, and the possible existence of self-report biases in the perception of musculoskeletal discomfort and ergonomic climate, which may affect the validity of the results . Despite these limitations, the results of this study provide empirical evidence on the relationship between ergonomic climate and musculoskeletal discomfort, highlighting the importance of implementing effective ergonomic policies and ongoing training programs. Companies should consider these findings to improve the well-being of their workers and, consequently, optimize work performance and productivity. It is recommended to carry out longitudinal studies to strengthen these findings and to further explore specific interventions that could mitigate ergonomic risks in the workplace.

The results of this study show a significant relationship between the perception of the ergonomic climate in the company and the prevalence of musculoskeletal complaints in workers in the companies of the three cities where the research was carried out. The high incidence of neck complaints and the low perception of training in well-being and occupational health highlight the need for targeted ergonomic interventions.

The association between low perceived managerial commitment and increased neck pain highlights the importance of strengthening ergonomics and occupational health and safety policies at the management level. Likewise, the correlation between the lack of knowledge about business indicators and the higher prevalence of shoulder and elbow pain, as well as between the lack of training in well-being and health and pain in various body regions, highlight the need to develop public policies that encourage the adoption of ergonomic practices in the workplace, with emphasis on high-risk sectors. In addition, it is necessary to implement epidemiological surveillance programs that promote the reduction of the incidence and prevalence of occupational diseases or work accidents that affect the overall health of the working population.

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The authors declare that they have no conflicts of interest.

Disclaimer

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Declaration of contribution by authors

All authors contributed to the design of the manuscript, data analysis and general writing. We all participated in

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References

1. Bazaluk O, Tsopa V, Cheberiachko S, et al. Ergonomic risk management process for safety and health at work. Front. Public Health. 2023;11:1253141. DOI: https://doi.org/10.3389/fpubh.2023.1253141
2. Heidarimoghadam R, Mohammadfam I, Babamiri M, et al. What do the different ergonomic interventions accomplish in the workplace? A systematic review. Int J Occup Saf Ergon. 2022;28(1):600-24. DOI: https://doi.org/10.1080/10803548.2020.1811521
3. Faez E, Zakerian SA, Azam K, et al. An Assessment of ergonomics climate and its association with self-reported pain, organizational performance and employee well-being. Int. J. Environ. Public Health Res. 2021;18(5):2610; https://doi.org/10.3390/ijerph18052610
4. Hoffmeister K, Gibbons A, et al. Ergonomics climate assessment: A measure of operational performance and employee well-being. Appl Ergon. 2015;50:160-9. DOI: https://doi.org/10.1016/j.apergo.2015.03.011
5. Bernal GI, Pedraza N, Sánchez M. The organizational climate and its relationship with the quality of public health services: design of a theoretical model. Estud. Geren [internet]. 2015 [cited 2024 Jan. 26]; 31 (134):8-19. Available at: http://www.scielo.org.co/scielo.php?pid=S0123-59232015000100003&script=sci_abstract&tlng=es
6. Litardo VC, Díaz CJ, Perero EG. Ergonomics in the prevention of health problems in workers and its social impact. Rev. Cuba. Eng. [internet]. 2019 [cited 2024 Jan. 20]; 10(2):3-15. Available at: https://rci.cujae.edu.cu/index.php/rci/article/view/720
7. Sánchez-Vidal G, et al. Health promotion in screen-viewing jobs. Rev. Cuba. Med. Gen. Integr. [internet]. 2016 [cited 2024 Jan. 22]; 32(3):1-11. Available at: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0864-21252016000300003
8. Peña PD, Toala PM, Toala PB. Work overload: effects on productivity and quality of life. Recimundo. [internet]. 2022 [cited 2024 Jan. 15];6(Suppl. 1):29-40. Available at: https://recimundo.com/index.php/es/article/view/1625
9. Máynez GA, Cavazos AJ. Consequences of burnout in convenience stores. Adm. Investig. 2021;50(128):1-18. DOI: https://doi.org/10.35426/iav50n128.03
10. Osley Garzón DM, Vásquez TE, et al. Working conditions, ergonomic risks and the presence of musculoskeletal disorders in coffee pickers in a municipality in Colombia. Rev Asoc Esp Espec Med Trab. [internet]. 2017 [cited 2024 Jan 15]; 26(2):127-36. Available at: https://scielo.isciii.es/pdf/medtra/v26n2/1132-6255-medtra-26-02-00127.pdf
11. Mendinueta M, Herazo Y. Perception of musculoskeletal discomfort and postural risk in workers of a higher education institution. Salud, Barranquilla. 2014;30(2):170-9. DOI: https://doi.org/10.14482/sun.30.1.4309
12. García MJ, Moreno LA, De la Cruz SE. Physical activity and health-related lifestyle in the Spanish population with musculoskeletal disease. Nutr. Hosp. 2021;38(1):128-38. DOI: https://doi.org/10.20960/nh.02998
13. Takala J, Hämäläinen P, Sauni R, et al. Global-, regional- and country-level estimates of the work-related burden of diseases and accidents in 2019. Scand J Work Environ Health. 2024;50(2):73-82. DOI: https://doi.org/10.5271/sjweh.4132
14. James SL, Abate D, Abate KH, et al. Global, regional, and national, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990-2017: A systematic analysis for the Global Burden of Disease Study 2017. Lancet. 2018;392(10159):1789-858. DOI: https://doi.org/10.1016/s0140-6736(18)32279-7
15. Park JW, Kang M, Kim JI, et al. Influence of coexposure to long working hours and ergonomic risk factors on musculoskeletal symptoms: An interaction analysis. BMJ Open 2022;12(5):e055186. DOI: https://doi.org/10.1136/bmjopen-2021-055186
16. Luna GJ. Ergonomics in the construction of workers' health in Colombia. Rev. Cienc. Salud. 2014;12(Suppl. 1): 77-82. DOI: https://doi.org/10.12804/ revsalud12.esp.2014.08
17. Kuorinka I, Jonsson B, Kilbom A, et al. Standardized Nordic questionnaires for the analysis of musculoskeletal symptoms. Appl Ergon. 1987;18(3):233-7. DOI: https://doi.org/10.1016/0003-6870(87)90010-x
18. González ME. Validity and reliability study of the standardized Nordic questionnaire for the detection of musculoskeletal symptoms in the Mexican population. Ergonomics, Research and Development. 2021;3(1):8-17. DOI: https://doi.org/10.29393/EID3-1EVEG10001
19. Colombia, Ministry of Health. Resolution 8430, establishing scientific, technical and administrative standards for health research (1993 Oct. 4).
20. World Medical Association (WMA). WMA Declaration of Helsinki – Ethical principles for medical research involving human subjects. Strength: 64th WMA General Assembly; 2013.
21. World Health Organization (WHO). Musculoskeletal disorders. Geneva, Switzerland [internet]; 2021 [cited Jan 2024 22]. Available at: https://www.who.int/es/news-room/fact-sheets/detail/musculoskeletal-conditions
22. Cieza A, Causey K, Kamenov K, et al. Global estimates of the need for rehabilitation based on the Global Burden of Disease study 2019: A systematic analysis for the Global Burden of Disease Study 2019. Lancet. 2021;396(10267):2006-17. DOI: https://doi.org/10.1016/S0140-6736(20)32340-0
23. Ramírez MJ, Cantos EM, Molina JA. Musculoskeletal symptoms present in workers of a fish company in Manta, Ecuador 2019. Dom. [internet]. 2019 [cited 2024 Jan. 22]; 5(2):661 -72. Available at: https://dialnet.unirioja.es/descarga/articulo/7343729.pdf
24. Salazar P, Alvarado FD, Holguín LG. Organizational climate and its impact on job satisfaction: Case of the Covipen Security Company. Dom. Cien. [internet]. 2021 [cited 2024 Jan. 22]; 7(5):581 -96. Available at: https://dialnet.unirioja.es/servlet/articulo?codigo=8383818
25. Charpentier A, Feitó M, Freire A. Corporate social responsibility in small and medium-sized enterprises in the Los Chillo Valley. Scientific Journal of Agroecosystems [internet]. 2019 [cited 2024 Jan. 22];7(1):6-16. Available at: https://aes.ucf.edu.cu/index.php/aes/article/view/233
26. Benavides FG, Delclós J, Serra C. Welfare state and public health: the role of occupational health. Gac Sanit. 2018;32(4):377-80. DOI: https://doi.org/10.1016/j.gaceta.2017.07.007