Original article

Prevalence of musculoskeletal disorders and its relationship with ergonomic and psychosocial factors among office workers

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ABSTRACT

Background: Musculoskeletal disorders are associated with multiple factors relative to physical and psychosocial work environments, which contribute to the ergonomic risks that workers may be exposed in their labour routine. **Objective:** To verify the prevalence of musculoskeletal disorders (MSD) among office workers and its association with ergonomic risk, quality of life, work satisfaction and stress. **Methods:** Cross-sectional, comparative study including office workers with and without symptoms of MSD. Ergonomic risk was measured using the Rapid Upper Limb Assessment (RULA) and the Job Factors Questionnaire (JFQ), quality of life was analysed by WHOQOL-bref, work satisfaction by questionnaire Job Satisfaction Survey, occupational stress by Job Stress Scale and the prevalence of MSD was assessed using the Nordic Musculoskeletal Questionnaire. **Results:** 131 workers (66 males, mean age of 32.3±7.71 years) reported higher prevalence of MSD in the neck (47.5%) and lumbar (43.7%) regions. MSD was associated with physical, psychosocial and organizational work factors. **Conclusion:** Workplace psychosocial and ergonomic factors are related to MSD, causing impact on physical health and quality of life of office workers.

Key-words: Quality of life, Job satisfaction, Occupational stress, occupational risks.

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INTRODUCTION

Prevalence of musculoskeletal disorders (MSD) among office workers has been estimated in studies from around the world, which highlighted the neck, the lumbar spine, the shoulders and the wrists as the most affected body regions [1–4]. In Brazil, data from the Ministry of Labor and Social Security regarding accidental sickness benefits indicate that conditions affecting musculoskeletal system and the connective tissues were responsible for 18% of the benefits conceded during 2022[5].

Such symptoms are associated with multiple factors relative to physical and psychosocial work environments, which contribute to the ergonomic risks that workers may be exposed to in their labour routine. Studies report that workplace physical factors such as the maintenance of uncomfortable sitting posture, low work task variation, time in typing tasks, workstation ergonomics, and psychosocial and organizational factors such as limited resting breaks, inadequate ergonomic knowledge, job strain, high quantitative demands and low social support are some of the risk factors significantly associated with MSD in office workers[1,4,6,7].

Amongst all the factors related to the workplace, those in the biopsychosocial domain may cause effects that go beyond physical health and may also involve mental health indicators[8]. This can potentially lead to the development of clinical conditions, predict absenteeism or willingness to quit the job[9], in addition to resulting in higher governmental expenditures on health care.

Variables such as high work demands, poor job control, low colleague and supervisor support and increased effort-reward imbalance are described as work-related psychosocial risk factors with high predisposition to developing stress-related disorders[10].

Given the impacts caused by an unfavourable workplace, it is fundamental to recognize the ergonomic and psychosocial variables capable of contributing to mental and physical outcomes in office workers. Hence, this study aimed to describe the occurrence of MSD in office workers and to associate MSD with ergonomic risk, quality of life, work stress and job satisfaction.

METHODS

A cross-sectional study recruiting office workers from an agricultural company of the south of Brazil was conducted. The study was approved by the institutional ethics committee (protocol 1.554.008).

Adult office workers of both sexes aged between 18 and 75 years, available and willing to respond to the research questionnaires and to be observed during their labour tasks were recruited. Those presenting with any physical or cognitive disability or experiencing pregnancy were excluded. At the time of the study, approximately 160 people were employed in the administrative headquarters of the company.

Collection of data was performed using translated and validated self-reported questionnaires and by observation of labour tasks. All assessments were performed by a previously trained researcher. Initially, sociodemographic data (including age, sex, marital status, schooling degree) and work-related information (daily working time in hours and sitting time) were collected, followed by measures of abdominal circumference, weight and height. All participants who agreed to participate signed a consent form.

The body mass index (BMI) of everyone as calculated and categorized as underweight (lower than 18.5kg/m^2), normal weight (between 18.5 and 24.9kg/m^2), overweight (between 25 and 29.9kg/m^2) and obesity (30kg/m^2 or greater). In relation to abdominal circumference, values of 94 cm or higher for males and of 80cm or higher for females indicated increased cardiovascular risk, and values of 102 cm or higher for males and of 88 cm or higher for females indicated substantially increased cardiovascular risk. The reference values for BMI and abdominal circumference classification followed the recommendations by the World Health Organization (WHO) and the Brazilian Association for the Study of Obesity and Metabolic Syndrome.

The prevalence of MSD was assessed using the Nordic Musculoskeletal Questionnaire (NMQ)[11], considering only the symptoms (ache, discomfort, or pain) experienced in the neck, shoulders, wrists, hands and lumbar spine during the previous 12 months.

Two distinct instruments were used to evaluate ergonomic risk: The Rapid Upper Limb Assessment (RULA) method[12] and the Job Factors Questionnaire (JFQ)[13]. The RULA is based on direct observation of upper limb, neck, trunk and low limb postures during labour tasks performance, and results in a final score ranging from 1 to 7 (Score 1-2: negligible risk, no action required; 3-4: low risk, chance may be needed; 5-6: medium risk, further investigation, chance soon and 6 or higher: very high risk, implement chance now). The JFQ is a self-reported questionnaire comprising 15 questions in Likert scales from 0 to 10, in which 0 represents ‘no problem’ and 10 represents ‘the worst problem possible’. This instrument quantifies the

workers' perception over the risks they are exposed to, and therefore indicates the potential risk factors contributing to the development of musculoskeletal injuries[13,14].

Quality of life was assessed using the brief version of the World Health Organization Quality of Life questionnaire (WHOQOL-bref) translated and validated to Brazilian Portuguese[15]. This instrument consists of 26 questions and in the present study the following domains were considered: physical, psychologic, social relationships and environment, and their respective categories. For assessment of job satisfaction, the Job Satisfaction Survey was employed[16]. This questionnaire consists of 36 items, and its final score may correspond to dissatisfaction (36 to 108 points), does not represent dissatisfaction or satisfaction (109 to 143 points) and satisfaction (144 to 216 points). Job stress was evaluated using the short version of the Job Stress Scale[17] which comprises 17 questions grouped in three dimensions: psychological demand, meaning pressures of a psychological nature at work, whether quantitative (time and speed) or qualitative (conflicts between contradictory demands); job control, understood as the possibility of the worker using their intellectual abilities to carry out their work, as well as having sufficient authority to make decisions on how to carry it out; and social support at work, both from colleagues and bosses[17]. We analysed the score in each dimension and the results were categorized in low or high, with a basis on median values from the sample. Low psychological demand, high job control and high social support, were considered as positive for health.

Absolute data were expressed in mean and standard deviation, relative data in frequency. The U Mann-Whitney test was used to compare the medians of the JFQ score between groups with and without MSD. Chi-square test has been performed to investigate the relationship between RULA score, quality of life, job satisfaction and stress with MSD. All statistical analyses were performed using the SPSS version 22.0 and considered a significance level of 5%.

RESULTS

From the 160 individuals employed by the company, 15 were absent in the days of data collection, 12 were excluded (6 according to the exclusion criteria and other 6 for not responding to the questionnaires) and 2 declined to participate. Therefore, 131 workers (aged 32.39 ± 7.71 years, 50.4% males) were included. Some of them did not complete all the questionnaire's questions, however we decided not to remove them from analysis. Most were post-graduate (46.6%) and reported a workload of approximately 8.5 daily hours. Demographic, physical and psychological characteristics are presented in Table 1.

The neck (47.5%) and back (43.7%) regions were those with the highest percentages of MSD. Low psychological demand, low job control and low social support were verified in 52.7%, 56.5% and 55.0% of workers, respectively. About 71.8% of workers were satisfied with their work. In relation to quality of life, most participants were classified in the 'regular' category for the physical, psychological and environmental domains, and in the 'good' category for social relationships. Regarding ergonomic risk, the prevalence of wrist/hand disorders increased as the RULA score increased ($p = 0.018$). For other regions, the linear trend was not significant ($p > 0.10$). Figure 1 shows the occurrence of MSD in each region of the body, according to the RULA scores.

Chi-square tests revealed significant associations between not experiencing neck ($p=0.043$), shoulder ($p = 0.026$), wrist/hand ($p = 0.014$) or back ($p = 0.015$) MSD with 'good' quality of life in the physical domain. In the WHOQOL-bref psychological domain, significant associations were found between having wrist/hand disorder ($p = 0.025$) and the 'needs improvement' category, and between having back disorder ($p = 0.006$) and 'needs improvement' and 'regular' categories.

Job satisfaction was associated with not experiencing MSD in shoulders ($p = 0.010$), wrists/hands ($p = 0.008$) or back ($p = 0.021$).

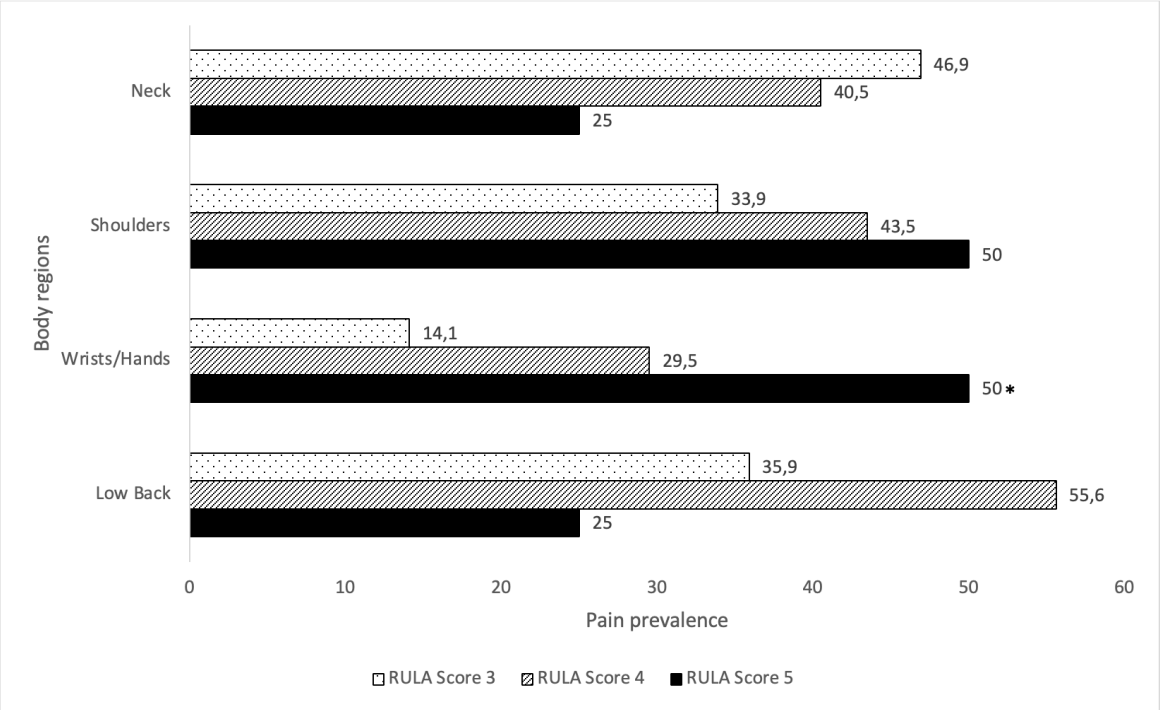
Table 2 shows MSD occurrences of each body part relative to the dimensions and categories of job stress, according to the categorization low or high, with a basis on median values from the sample. High social support was associated with not experiencing wrist/hand disorder, when compared to those below the median, understanding 'social support' as the relationships with colleagues and bosses within the work environment. MSD in the other body parts was not associated with any of the job stress dimensions.

Table 1. Sociodemographic characteristics of the sample

Variables		Number (%)
Sex (N=131)		
	Male	66 (50.4)
	Female	65 (49.6)
Marital status (N=130)		
	Single	68 (52.3)
	Married	58 (44.6)
	Divorced	4 (3.1)
Schooling (N=131)		
	Unfinished high school	1 (0.8)
	Unfinished graduation	31 (23.7)
	Finished graduation	38 (29.0)
	Post-graduation	61 (46.6)
BMI (kg/m^2) (N=117)		
	Eutrophic	52 (44.4)
	Overweight	47 (40.2)
	Obesity	18 (15.4)
Abdominal circumference (cm) (N=126)		
	Normal	63 (50.0)
	High	34 (27.0)
	Substantially high	29 (23.0)
Site of musculoskeletal pain (N=191)		
	Neck	58 (47.5)
	Shoulders	49 (39.2)
	Wrists/hands	29 (23.2)
	Low back	55 (43.7)
Quality of life		
	Physical health domain (N=130)	
	Needs improvement	6 (4.6)
	Regular	69 (53.1)
	Good	55 (42.3)
	Psychological demand (N=130)	
	Needs improvement	9 (6.9)
	Regular	71 (54.6)
	Good	49 (37.7)
	Very good	1 (0.8)
	Social relationships domain (N=131)	
	Needs improvement	11 (8.4)
	Regular	42 (32.1)
	Good	64 (48.9)
	Very good	14 (10.7)
	Environment domain (N=130)	
	Needs improvement	18 (13.8)
	Regular	93 (71.5)
	Good	19 (14.6)
Job satisfaction (N=131)		
	Does not represent dissatisfaction or satisfaction	37 (28.2)
	Satisfaction	94 (71.8)
Job stress (N=131)		
	Psychological demand	
	High	62 (47.3)
	Low	69 (52.7)
	Job control	
	High	57 (43.5)
	Low	74 (56.5)
	Social support	
	High	59 (45.0)
	Low	72 (55.0)

Legend: BMI = body mass index.

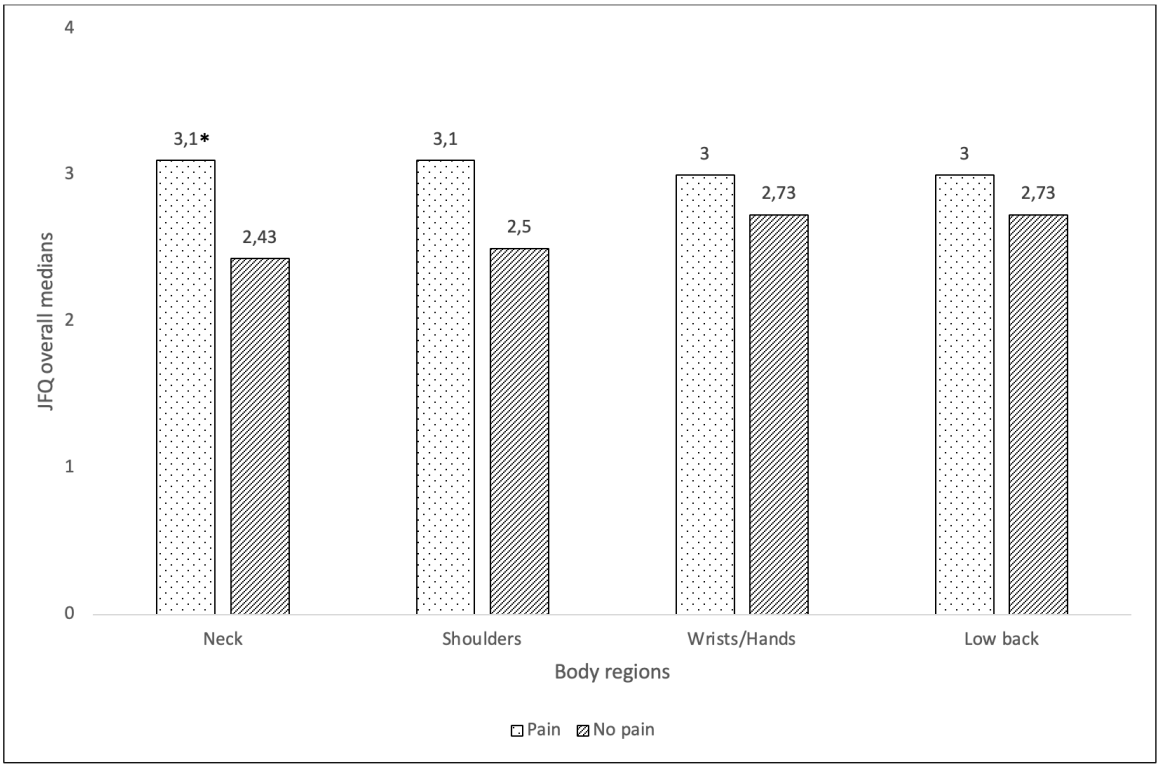
Figure 1. Percentual occurrence of pain by body region according to Rapid Upper Limb Assessment scores (n=131).



Legend: * Chi-square test of linear trend=5.63; p=0.018; RULA=Rapid Upper Limb Assessment.

Figure 2 shows ergonomic risk assessed through the JFQ and demonstrates significantly different between those with and without neck disorder.

Figure 2. Occurrence of pain by body region according to the Job Factors Questionnaire (n=131).



Legend: * Teste U de Mann-Whitney=1440; p=0.019; JFQ= Job Factors Questionnaire.

Table 2. Occurrence of pain by body region, according to the dimensions and categories of job stress

Body regions	Pain	Psychological demand		Job control		Social support	
		High n (%)	Low n (%)	High n (%)	Low n (%)	High n (%)	Low n (%)
Neck	No	31 (25.4)	33(27)	38 (31.1)	26 (21.3)	35 (28.7)	29 (23.8)
	Yes	32 (26.2)	26 (21.3)	30 (24.6)	28(23)	31 (25.4)	27 (22.1)
Shoulders	No	37 (29.6)	39 (31.2)	47 (37.6)	29 (23.2)	40 (32)	36 (28.8)
	Yes	27 (21.6)	22 (17.6)	23 (18.4)	26 (20.8)	29 (23.2)	20(16)
Wrists/hands	No	50 (40)	46 (36.8)	53 (42.4)	43 (34.4)	46 (36.8)*	50(40)
	Yes	14 (11.2)	15(12)	18 (14.4)	11(8.8)	23 (18.4)	6(4.8)
Low back	No	38 (30.2)	33 (26.2)	37 (29.4)	34(27)	38 (30.2)	33 (26.2)
	Yes	27 (21.4)	28 (22.2)	35 (27.8)	20 (15.9)	32 (25.4)	23 (18.3)

Legend: *Chi-Square test=8,876; p=0,003; High=above the median; Low=below the median.

DISCUSSION

This study aimed to investigate the prevalence of musculoskeletal pain in office workers, as well as verify its associations with ergonomic risk, quality of life and occupational stress. Studies conducted with office workers in several countries, including Brazil reported sociodemographic characteristics and prevalence of MSD comparable to those reported in our study. Most of these studies' findings showed prevalence higher than 40% of MSD in back and upper limbs, being the neck, back, shoulders and wrists/hands the most affected body part[1–4,18–21], similarly to our study for the neck and back regions. Their samples comprised predominantly women, between ages of 20 to 40 years, with normal BMI and workload from 31 to 49 weekly hours[2,4,18], differing only in relation to sex, since both sexes participated in this study similarly.

Exposure to stressors (such as organizational and psychosocial aspects of work) generates different responses in the body[22], which should be considered in research on the physical health of office workers. In our study, more than half of the workers were in the low job control and low social support category. The impossibility of workers to use their intellectual abilities to carry out their work may lead to loss of skills and lack of interest. The social support provided by colleagues or supervisors has a moderating effect in situations of threat, improving the ability to cope with different work situations[23]. Our results showed that the presence of social support in the work environment was a protective factor for physical disorders, since high social support was associated with not experiencing wrist/hand disorder. Studies with other professional categories highlight the relevance of social support in organizational aspects and workers' health, so that the work engagement coefficient increased as perceived social support in the workplace increased in Japanese workers[24], as well as low social support is a risk factor for increased burnout among healthcare professionals[25]. Furthermore, among psychosocial factors related to work, job demand, job control, social support, job satisfaction and unbalanced effort-reward ratio, implicate in intensification of workers' MSD, disability and stress[10,26].

In research involving populations from various countries, it was observed that in Latin-American countries more than 75% of workers reported working under pressure, compared to a prevalence of 54% in European countries[2]. Physical and psychosocial factors also were associated with MSD in office workers in Malaysia and Australia[27].

In several of the studies above-mentioned, the interaction of physical and psychosocial factors seems to occur more frequently, such as associations between MSD and lower reports of quality of life[28]. In the present study, workers who did not report MSD at the neck, shoulders, wrists/hands and low back classified their quality of life as good in the physical domain. Otherwise, those with MSD reported worse quality of life in the psychological demand evaluated by WHOQOL-brief, which, in general, agrees with previous studies.

However, these factors did not seem to interfere with job satisfaction rates (71.8% satisfied), although the quality of life was classified by most of participants as regular in three out of four domains of the assessing instrument (physical, psychological and environmental). A plausible and worrisome hypothesis is that such indicators are inherent to office worker's tasks, then they end up naturalized in the organizational environment.

On the other hand, both job satisfaction and social support seem to manifest as factors of protection for MSD. These findings reinforce the importance of psychosocial workplace factors in the current worldwide scenario, as described above. It was also observed by Jun et al.[29], which demonstrates that social support along with coping strategies were moderators in the relationship between job stress and psychological suffering. Furthermore, they play a fundamental role in establishing effective occupational interventions centred on both individuals and community, in order to minimize not only physical, but also psychological overload.

The relation between MSD and ergonomic risk, measures of RULA and the overall JFQ did not show similar results. When assessed by the RULA score, the association between pain and ergonomic risk occurred in the wrist/hand region (Figure 1) and, when assessed by the JFQ, in the neck region (Figure 2). Kaliniene et al.[4], using RULA method, indicated significant differences between those with and without pain, so that workers who had reported MSD at the shoulder, wrist/hand, neck and back scored higher. Studies with similar populations reported other ergonomic risks (physical, organizational and psychosocial) related to MSD in different body regions, and they were associated to daily use of computers, inadequate sitting posture, repetitive movements, work overload, limited resting intervals, insufficient ergonomic knowledge and workload superior to 40 weekly hours[1,2,27,30].

There are some limitations in the present study that require acknowledgement and discussion. First, the use of the RULA method to identify ergonomic risks was not able to assess all postures in which workers perform their tasks, as it only considers the most frequently adopted postures. Second, assessment bias may be present in the self-reported questionnaires once workers may have been fearful of losing their jobs according to the answers provided. This bias must be considered especially in relation to measurements of job satisfaction. Lastly, data of musculoskeletal disorders over the past 12 months were collected through worker reports, thus it may have been influenced by memory bias.

CONCLUSION

This study found a high occurrence of MSD at the neck and back, mainly. In relation to quality of life, those without MSD (neck, shoulder, wrist/hand or low back) ranked their quality of life as good in the physical demand. Oppositely, workers reporting MSD in wrist/hand and low back had worse classification in the psychological domain of quality of life questionnaire, which highlights the complexity of pain as an individual, subjective and emotional experience. Ergonomic risk assessed by RULA and JFQ did not present concordant results in relation to MSD, with RULA being associated with MSD in wrists/hands and JFQ in the neck. Social support was associated with the absence of pain in wrists/hands, emphasizing its importance in the work environment.

Factors of physical, psychological and social nature were associated with the occurrence of MSD in office workers. Therefore, we encourage further investigations aimed at understanding in detail these relationships that affect the health and performance of office workers

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