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Association of musculoskeletal disorders with activity performed in the workplace

Associação dos distúrbios músculo-esqueléticos com a atividade desempenhada no local de trabalho

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Abstract: The aim of the present study was to analyze the association between the activity performed in the workplace and symptoms of musculoskeletal disorders (MSD) in different body regions. We evaluated 146 employees, divided into two sectors: sector I (n=61), cleaning and building maintenance, and sector II (n=85), administrative sector. The employees answered the census of the ergonomics questionnaire that assesses MSD reported in different body regions. In sector I, 39.6% (n=19) of the employees had symptoms in the lower limbs, with an association between activity performed and body region reported (p=0.025). In sector II, 51.7% (n=31) of the employees had symptoms in the neck and 26.7% (n=16) in the wrist, with an association between activity performed and body region reported (p=0.001 and p<0.002, respectively). The results showed that employees had MSD symptoms associated with the activity performed, indicating the need to develop specific interventions for each kind of workplace.

Key Words: Musculoskeletal Disorders; Activities of Daily Living; Workplace.

Resumo: O objetivo do estudo foi analisar a associação entre as atividades realizadas no local de trabalho com os sintomas de distúrbios músculo-esquelético (DMS) na região do corpo. Foram avaliados 146 funcionários, separados em setor I (n=61) que trabalham com limpeza e manutenção predial; setor II (n=85), os funcionários trabalham no setor administrativo. Os funcionários responderam o questionário Censo de ergonomia que avalia a DMS em diferentes regiões do corpo. No setor I, 39,6% (n=19) dos funcionários relataram sintomas nos membros inferiores com associação entre a atividade realizada e a região do corpo (p=0,025). No setor II, 51,7% (n=31) dos funcionários apresentaram sintomas no pescoço e 26,7% (n=16) no punho, com associação entre a atividade exercida e a região do corpo (p=0,001, p=0,002, respectivamente). Os resultados mostraram que os funcionários apresentavam associação dos sintomas de DMS com a atividade realizada. Assim, o desenvolvimento de intervenções específicas para cada tipo de trabalho mostra-se necessária.

Palavras-chave: Doenças Musculoesqueléticas; Atividades Cotidianas; Local de Trabalho.

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Introduction

Complaints of the arm, neck and shoulders (CANS), other disorders such as low back pain (LBP), and lower limb problems are common among employees depending on the type of job and workplace. These disorders may be due to repetitive movements, awkward posture, and impact of force[1-3]. Studies have shown associations between different kinds of jobs and the development of specific musculoskeletal disorders (MSD) in different body regions such as the back and upper and lower extremities[4]. Thus, employees who work sitting or standing are exposed to different risk factors[5]. In Brazil, Norm 17 (NR17) recommends the sitting position when possible. However, some studies have shown that the ideal is postural change. Habitual postures without positional changes can lead to tissue damage, fatigue, limited motion, or deformity[6].

A previous study reported that occupational physical activity such as lifting of very heavy loads in the workplace predisposes to hip osteoarthritis[7]. In addition, a prospective study of MSD among office workers showed that occupational physical activity was associated with hand, arm, shoulder, and neck symptoms[8]. However, MSD symptoms are induced by a wide variety of underlying causal mechanisms and further observational and experimental research is required[9].

The incidence of MSD in different parts of the body has been increasing. In the United States, the prevalence of MSD corresponds to 56 to 65% of all occupational diseases[10]. In developing countries the prevalence and cause of MSD need to be further investigated. In Brazil, the prevalence of MSD-related benefits among workers in the private sector was 93.6/10,000 workers, with the top four most common benefits being due to back pain, intervertebral disc disorders, synovitis/tenosynovitis, and shoulder disorders[4]. MSD are important health problems, causing increased absenteeism and need for medical treatment, with important consequences for society[11]. Therefore, there is a need to investigate and prevent these disorders.

The analysis and understanding of the correlation between MSD in different regions of the body and the kind of activity performed appear to be appropriate in order to propose specific strategies and interventions. Thus, the aim of the present study was to analyze the association between MSD symptoms in different body regions and the activity performed in the workplace.

Methods

This was a quantitative and comparative study based on the proposed assessment of the association between activities performed in the workplace and MSD symptoms in different body regions among employees of a private company in the state of Sao Paulo. The study was approved by the Institutional Research Ethics Committee (Protocol No. 0069/10) and all subjects gave written informed consent to participate.

Subjects

The study involved the employees (n = 146) of two sectors of a Brazilian company. All 453 employees were invited to participate in the study. Of these, 152 agreed to participate, but six questionnaires were completed incorrectly. Thus, the final sample consisted of 146 (32.2%) employees (33 men and 113 women), wit a mean age: 36.5 ± 10 years.

The activities were characterized by different physical postures, according to the activity performed in each job and workplace. In sector I (n = 61), the employees work with cleaning and building maintenance. During their activities they may be sitting, standing, walking, etc. However, in the present study, the workers of sector I performed their activities in the standing or squatting position for most of their 8-hour shift. In sector II (n = 85), the administrative office, the activities of the employees mainly involve the use of a computer and are performed in the sitting position. Computer work is done most often using Microsoft Word, Excel and Internet sites. The workers also make phone calls and use some hand-writing (mainly notes). Workers of both sectors have a workday of 8 hours and work 5 days a week. Additionally, sector I workers are required to work 4 hours on Saturdays. None of the workers are involved in

any workplace exercise (gymnastics) or in preventive actions to minimize MSD.

Data collection

The census of the ergonomic questionnaire was developed in order to analyze the origin of MSD symptoms and to facilitate comparison of the results between studies. The questionnaire covers all body areas, with yes or no responses to the presence of MSD symptoms (discomfort, numbness and/or pain) in the different body regions[12]. This questionnaire does not have a score and has been previously used and published in some Brazilian studies[12-14].

Data were collected in the morning and evening over a period of 5 weeks between May and June. The questionnaires were given to the employees, who were informed about how to fill them out and encouraged to express their possible doubts.

Data analysis

The data were entered into an Excel spreadsheet and descriptive results are reported as means, standard deviations, and percentages. A contingency table was created to analyze the association between reported MSD and sectors I and II. Associations were analyzed statistically by the chi-square test using the GraphPad InStat 3.06 software for Windows (GraphPad Software, Inc.), with the level of significance set at $\alpha = 0.05$.

Results

Seventy-nine percent (n = 48) of the employees in sector I reported some MSD symptoms. Of these, 39.6% (n = 19) had symptoms in the lower limbs, with an association between activity performed and body region reported (p = 0.025). The same number of subjects, 39.6% (n = 19), had symptoms in the back, but no significant association was observed (Table 1).

Table 1. Distribution of employees with musculoskeletal symptoms in different body regions

Body region	Both sectors		Sector I		Sector II		P-value
	N	%	N	%	N	%	
Head	10	9.3	6	12.5	4	6.7	0.299
Neck	39	36.1	8	16.7	31*	51.7*	0.001
Shoulder	42	38.9	16	33.3	26	43.3	0.29
Back	50	46.3	19	39.6	31	51.7	0.211
Arm	19	17.6	9	18.8	10	16.7	0.778
Elbow	7	6.5	1	2.1	6	10.0	0.097
Forearm	10	9.3	5	10.4	5	8.3	0.711
Wrist	18	16.7	2	4.2	16*	26.7*	0.002
Hand	8	7.4	4	8.3	4	6.7	0.742
Hip	12	11.1	4	8.3	8	13.3	0.411
Thigh	12	11.1	5	10.4	7	11.7	0.837
Knee	22	20.4	9	18.8	13	21.7	0.708
Leg	31	28.7	19*	39.6*	12	20.0	0.025
Ankle/feet	8	7.4	9	18.8	8	13.3	0.443

* $p < 0.05$

In sector II, 71% (n = 60) of the employees reported some MSD symptoms. Of these, 51.7% (n = 31) showed pain in the neck, with the observation of strong association between activity performed and body region reported (p = 0.001). There was a high prevalence of MSD symptoms in the back (51.7%, n = 31), but no significant association with sector was observed (Table 1). Sector II was strongly associated (p = 0.002) with MSD symptoms in the wrist (26.7%, n = 16).

Discussion

In the present study, a high prevalence of MSD in the back was observed in both sectors. Although no significant association was seen between back pain and workplace, these results suggests that activity performed in the sitting or standing position is a risk factor for back pain symptoms. This high prevalence may be related to several factors, including static postures, repetitive movements, ergonomic conditions, physical inactivity,

and stress[3,11,15,16]. According to the World Health Organization, at least 80% of the general population report the experience of back pain in their lifetime[17]. Back pain is an important health problem that has serious social and economic implications such as low productivity, lost time at work, and permanent disability, resulting in enormous healthcare costs[11,18,19].

Some studies have shown an association between sitting and MSD symptoms in the back[20,21,22]. Long periods of time spent in sitting and sedentary work have increased. This type of work can lead to decreased blood circulation and increased static loading of the spine and surrounding musculoskeletal tissues, resulting in MSD symptoms[15,23,24]. A recent study demonstrated very low activation of lumbar muscles while sitting, a situation that may transmit the load through passive structures such as ligaments and intervertebral discs, causing back pain[25]. On the other hand, the standing position is considered to be a dynamic posture, but can involve heavy lifting, awkward posture, impact of force and inappropriate ergonomic conditions that result in MSD symptoms[26,27].

Similar to the present findings (39.6%), studies have reported prevalence rates of 20% to 60% for MSD symptoms in the lower limbs[28,29]. The present study showed an association between MSD symptoms in the lower limbs and activity performed in sector I. This can be explained by the fact that the cleaning and building maintenance workers perform their activities while standing/walking, squatting/kneeling, climbing stairs or ladders, and lifting weights. This situation has been associated with the development of venous disorders and overload in the lower limbs, resulting in MSD symptoms[30,31]. A recent study showed that the standing position involves a greater biomechanical load than the sitting position[5]. Additionally, lower limb MSD can often result in a greater degree of immobility and thereby substantially degrade the quality of life when compared to upper limb MSD[32].

The high prevalence of MSD symptoms in the neck (51.7%) and wrists (26.7%) in sector II was strongly associated with the activity performed. Similar to the present findings, the prevalence of neck and wrist pain has been reported to be about 48.5%[33] and 14.4%[34], respectively, for adults in different countries. This can be explained by the type of work performed by the employees, which mainly involves movement of the upper limbs and static posture of the neck. These activities most of the time involve tasks that require concentration, static positions and repetitive movements of the upper body region. In addition, the awkward posture of the neck associated with inappropriate ergonomic conditions during the activity performed can cause muscle tension and chronic pain[35,36].

Conclusion

The present study showed a high prevalence of MSD symptoms in the back in the two sectors. An association was observed between body region pain and the activity performed. While an association with MSD symptoms in the lower limbs was observed in sector I, a strong association with MSD symptoms in the neck and wrist was found in sector II. These results indicate that more specific assessments and interventions are necessary for each type of activity performed in the workplace.

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Asociación de los trastornos musculoesqueléticas con la actividad realizada en el lugar de trabajo

Resumen: El objetivo del estudio fue analizar la asociación entre las actividades realizadas en el lugar de trabajo con relación a los síntomas de lesiones musculoesqueléticas (LMS) en la región del cuerpo. Fueron evaluados 146 funcionarios, separados en diferentes sectores; en el sector I (n=61) funcionarios que trabajan con limpieza y manutención de predios; sector II (n=85), funcionarios que laboran en el sector administrativo. Los funcionarios contestaron al cuestionario Censo de ergonomía que evalúa las LMS en diferentes regiones del cuerpo. En el sector I, 39,6% (n=19) de los empleados informaron síntomas en los miembros inferiores con la asociación entre la actividad realizada y la región del cuerpo (p=0,025). En el sector II, 51,7% (n=31) de los empleados informaron síntomas en el cuello y 26,7% (n=16) en la muñeca, de la asociación entre la actividad realizada y la región del cuerpo (p=0,001, p=0,002, respectivamente). Los resultados mostraron que los funcionarios presentaban asociación de los síntomas de LMS con la actividad realizada. Así, el desarrollo de intervenciones específicas para cada tipo de trabajo se considera necesaria.

Palabras claves: Enfermedades Musculoesqueléticas; Actividades Cotidianas; Lugar de Trabajo.