# Factors associated with musculoskeletal disorders in administrative workers at an educational institution

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**Eduardo Filoni[1], Cristina Nunes Capeloa[2], Carlos Alberto Ocon[3], Cristina Braga[4], Erinaldo Luiz de Andrade[5], Gleyce Kelly de Brito Brasileiro Santos[6], Roberta Cristina das Rocha Sudré[7], Alessandro de Freitas[8], Valnice de Oliveira Nogueira[9], Christian Douradinho[10], Alfredo Ribeiro Filho[11], Fabrício Vieira Cavalcante[12], Márcio Fernandes da Cunha[13], Leandro Lazzareschi[14].**

[1] Doctor of Science
Cruzeiro do Sul University
Email: edufiloni@hotmail.com.br
[2] Doctor in Biophotonics Applied to Health Sciences
Nove de Julho University (UNINOVE)
E-mail: cristina.capeloa@uni9.pro.br
[3] Doctor of Health Sciences in Medicine
Nove de Julho University (UNINOVE)
E-mail: cocion@uni9.pro.br
[4] Doctor in Health Sciences from the Institute of Medical Assistance to the State Public Servant of S. Paulo (IAMSPE)
Universidade Nove de Julho, Institute of Medical Assistance to the State Public Servant of S. Paulo
E-mail: cris.br@terra.com.br
[5] Doctor in Physical Education from the São Judas Tadeu University - USJT
Nove de Julho University
Email: erinaldo_andrade@uol.com.br
[6] Master's Degree in Nursing from the Federal University of Sergipe
Federal University of Sergipe and Brazilian Company of Hospital Services – EBSERH
Email gkbsantos@hotmail.com
[7] Specialist in Collective Health with Emphasis on Family Health
Email: roberta.sudre@uni9.pro.br
[8] Doctor in Adapted Physical Activity from the State University of Campinas - UNICAMP.
Universidade Nove de Julho.
E-mail: tcc.ale@gmail.com
[9] Doctor in Sciences -UNIFESP/ Full Coordinator COREMU SMS SP
E-mail: vallnog@yahoo.com.br / valnogueira@prefeitura.sp.gov.br
[10] Master in Medical Sciences Focus on Gerontology from the Faculty of Medicine of the University of São Paulo (FMUSP)
Nove de Julho University
Email: c.douradinho@uni9.pro.br
[11] Professional Master's Degree in Pharmacy. UNIBAN
Email: arfmm@uol.com.br
[12] Master in Collective Health (Epidemiology)
University of Brasília (UnB)
E-mail: fabricioocavalcante@gmail.com
[13] Master of Science in Health Sciences
Institution: Cruzeiro do Sul University
E-mail: marciofdc@terra.com.br
[14] Doctor in Biomedical Engineering
Cruzeiro do Sul University and São Camilo University Center
E-mail: leandro@lazza.com.br

## ABSTRACT

Introduction: Workers' quality of life is involved in the field of public health, which has been creating spaces for the identification and prevention of work-related diseases, especially musculoskeletal diseases, due to their scope and magnitude. Thus, a study was carried out with the objective of knowing the musculoskeletal symptoms presented by workers in a private institution. Objective: To identify the prevalence and risk factors associated with work-related musculoskeletal disorders. Methods: Data were collected through a cross-sectional study, and a questionnaire was applied to the sample of 62 employees who worked at the institution. The instrument was based on a questionnaire translated and validated for the Portuguese language: the NMQ "Nordic Musculoskeletal Questionnaire". Sociodemographic and occupational characterization variables were collected. The data were analyzed using univariate and multivariate logistic regressions at a significance level of 5%. Results: Among the workers, the following predominated: female; age group from 20 to 30 years old; complete high school; married with children. The highest prevalence of WMSD was in women. The associations found were: non-practitioners of physical activity in the "neck" region (OR 4.98, 95%CI 1.147 – 21.59); and the "wrist and hand" region (OR 6:22; 95%CI 1.5425.15); In the multivariate analysis (multiple logistic regression), the factors associated with pain were: physical activity women also those who did not practice physical activity reported more pain than those who practiced in the neck region 28 employees (73.3%); p= 0.039), with this the association between musculoskeletal symptoms and the variables physical activity and gender was observed. Conclusions: In this context, it can be concluded that there was a prevalence of pain among the professionals studied, and that this has a significant association with several aspects related to work, and some sociodemographic and health factors. In view of the results found, it is necessary to develop and implement strategies to alleviate the workload and avoid problems for these employees.

**Keywords:** Quality of Life, Nordic Questionnaire, Musculoskeletal Disorder, Risk Factors, Work.

## INTRODUCTION

With the great technological advance, the work process has evolved in search of greater productivity in a scheme of automation and specialization. Such a situation often forces the worker to intense and inadequate movements of the spine, upper limbs, scapular region and neck, often leading to neuro-musculotendon disorders. The introduction of new technologies and the rapid change in marketing and production strategies have influenced the volume of work and the need for more flexible work arrangements (Brandão et al. 2005). The development of information technology has changed working conditions. Unfortunately, some companies subject workers to precarious working conditions, involving physical, ergonomic and mechanical risks, among others arising from their activity (Barbosa, Assunção, Araújo, 2012); (Barbosa, 2023).

The physiological and psychic manifestations caused by the elements of the work process can be harmful in some cases. Changes in the dynamics of work organization, such as technological innovations, acceleration of the pace of work, unemployment have caused transformations in recent decades that directly reflect on the health of workers. Concomitantly with the changes in the work process, they obtained a better understanding of occupational diseases, with the search for their prevention and the development of research in the area of ergonomics. Along with these changes, there have been increases in both the incidence and recognition of various health problems, among which work-related musculoskeletal disorders (WMSD), also known as repetitive strain injuries (RSI), stand out (Lacman et al. 2000).

Musculoskeletal disorders are a serious public health problem and one of the most serious in the field of occupational health. The development of RSI/WMSD is multicausal, and it is important to analyze the risk factors involved directly or indirectly (Barros et al. 2003). Within the categories of risk situations, they can be considered physical when through excessive vibration, joint microinjuries occur, mechanical when there is a lack of protection, and trauma in general may occur, and, finally, as ergonomic, when due to inadequate planning of the workplace, they generate erroneous postures and exaggerated efforts of the upper and lower limbs and trunk (NORMATIVE INSTRUCTION INSS/DC° 98).

This problem affects workers in developed and underdeveloped countries, leading them to different degrees of functional disability. Worldwide, this disorder generates an increase in absenteeism and temporary or permanent leaves of absence of workers and produces significant costs in treatment and compensation (Murofuse et al, 2005); (Silva et al, 2004).

Among the main risk factors related to musculoskeletal disorders are: the organization of work (increased working hours, excessive overtime, fast pace, deficit of workers); environmental factors (inadequate furniture, insufficient lighting) and possible overloads of body segments in certain movements, for example: excessive strength to perform certain tasks, repetitiveness of

movements and inadequate postures in the development of work activities (De Carvalho et al, 2021). In relation to administrative sectors, the work environment is always evolving.

The objective of this study was to evaluate musculoskeletal symptoms and activities that require more effort for the musculoskeletal system.

## METHOD

This is a descriptive cross-sectional study approved by the Research Ethics Committee (CEP) of the University of Cruzeiro do Sul under CAE number 048/2010. The participants agreed and signed the Informed Consent Form, authorizing the publication of the data.

The sample was composed of employees of a higher education institution in the East Zone of São Paulo.

A total of 62 subjects participated in the study, 32 men and 30 women, with a mean age of 27.57 years and 8.5 years working at the institution. All the subjects of the study are part of the administrative staff of the IES (Higher Education Institution) and the activities developed involved the use of the computer for a period that varied from 5 to 8 hours a day.

All subjects who confirmed their participation after being informed about the objectives of the study by signing the Informed Consent Form (ICF) were included in the study. Acceptance and awareness of participation in the study occurred after understanding and accepting the ICF in accordance with resolution 196/96 of the National Research Ethics Committee.

Employees who disagreed with participating in this study did not participate in the study; away or on vacation.

The Nordic Musculoskeletal Questionnaire (NMQ) (Barros et al, 2003) was used, developed with the purpose of standardizing the measurement of reports of musculoskeletal symptoms and facilitating the comparison of results between studies. The authors of this questionnaire do not indicate it as a basis for clinical diagnosis, but for the identification of musculoskeletal disorders, being an important instrument for diagnosing the environment or workplace. There are three forms of NMQ: a general form, comprising all anatomical areas, and two others specific to the lumbar and neck and shoulder regions. The general form of the NMQ is the one presented in this study.

The instrument consists of multiple or binary choices regarding the occurrence of symptoms in the various anatomical regions in which they are most common. The respondent must report the occurrence of symptoms whose purpose is to measure the report of musculoskeletal symptoms. The materials used in the research were made available by the researchers, and by the University's Physical Therapy Clinic.

The study began with the search for theoretical references found in the Scielo, Lilacs, PubMed and Medline systems, using the following keywords: "Quality of Life", "Nordic

Questionnaire", "Musculoskeletal Disorder", "Risk Factors", "Work". The sample was composed of employees who practiced occupational kinesiotherapy.

A questionnaire about occupational activities and lifestyle habits was used for sociodemographic assessment. Regarding the questions about musculoskeletal symptoms, they were based on the Nordic Questionnaire (NQ), validated in Brazil (Pinheiro et al, 2002). The scale used was: Nordic Musculoskeletal Symptoms Questionnaire (NQ) (Baby et al, 2003) - The Nordic Musculoskeletal Questionnaire (NMQ) was developed with the purpose of standardizing the measurement of reports of musculoskeletal symptoms and facilitating the comparison of study results. The authors of this questionnaire do not indicate it as a basis for clinical diagnosis, but for the identification of musculoskeletal disorders and, as such, it can be an important instrument for diagnosing the environment or the function performed by the employee. The questions about musculoskeletal symptoms were based on the Nordic Musculoskeletal Symptoms Questionnaire.

The scales were applied accompanied by a trained physiotherapist to identify work-related pain or discomfort, its location and type of complaint; and the second, to characterize the frequency, intensity and duration of symptoms, as well as the consequences for work capacity (Kuorinka, 1998); (Machado et al, 2023).

A descriptive analysis of sociodemographic variables and musculoskeletal symptomatology and clinical-functional characteristics was performed. Next, considering the dependent variable (symptomatology), Fisher's test, t-test, for the independent sample and, at the end, logistic regression analysis, considering CI (95%). The level of significance was x= 0.05. Prevalence data are presented in the form of tables.

## RESULTS

Among the 62 participants in the study, 48.8% were female and 51.6% were male. Regarding age, 50% were in the age group of 20 to 30 years. The predominance of women is associated with a significant increase in the number of women in the labor market (Amaral, 2012)

Regarding the change of occupation, 12.5% changed their occupation more than once, as for marital status, 50.8% reported being married; in relation to children, 31% reported having children and 68.9% not having children; in relation to the mean BMI (Body Mass Index) of (24.14±3.88) for this sample; Regarding the length of function, the average work was 59.37 months; in relation to associated diseases, 4.9% reported and 95.1% did not report; Regarding lifestyle habits, 54.2% performed physical activity, and 45.8% were sedentary, according to the table.

Table 1. Sample characteristics. 2010.

| Sample characteristics | n | % |
|---|---|---|
| Sex | | |
| Male | 32 | 51,6% |

| | | |
|---|---|---|
| Female | 30 | 48,8% |
| Marital status | n | % |
| Married | 31 | 50,8% |
| Single/Divorced | 30 | 49,2% |
| Offspring | n | % |
| Yes | 19 | 31,1% |
| No | 42 | 68,9% |
| Associated Diseases | n | % |
| Yes | 3 | 4,9% |
| No | 58 | 95,1% |
| Perform Physical Activity | n | % |
| Yes | 32 | 54,2% |
| No | 27 | 45,8% |
| Change of occupation in the last 5 years | n | % |
| Yes | 9 | 14,5% |
| No | 53 | 85,5% |

Source: Authors

Regarding the prevalence of musculoskeletal symptoms, it is noted in Chart 2 that the most affected regions were in the neck, shoulders, upper back, wrist and hand.

Chart 2 - Prevalence of musculoskeletal symptoms reported by anatomical region, in the last twelve months - 2010

| Presence of musculoskeletal symptomatology | Yes | | No | |
|---|---|---|---|---|
| | n | % | n | % |
| Upper back | 15 | 26,4% | 46 | 75,4% |
| Neck | 11 | 19,3% | 46 | 80,7% |
| Shoulders | 10 | 16,1% | 52 | 83,9% |
| Ankles and feet | 8 | 13,3% | 52 | 86,7% |
| Elbow | 9 | 15,0% | 51 | 85,0% |
| Lower back | 7 | 11,5% | 54 | 88,5% |
| Knees | 6 | 9,8% | 55 | 90,2% |
| Hip/Thighs | 5 | 8,2% | 56 | 91,8% |
| Wrist and hand | 4 | 6,7% | 56 | 93,3% |
| Total | * | * | * | * |

* More than one response per participant.
Source: Authors

Regarding the prevalence of musculoskeletal symptoms, it is noted in Table 3 to Table 4 that the most affected regions were the shoulder, wrist/hand and lumbar spine, similar results found (Shahnavaz, 2003).

Table 3. Prevalence of WMSD in relation to females who do not practice physical activity.2010.

| Sites of referred pain | OR (Ods Ratio) | IC (95%) |
|---|---|---|
| Neck | 4,98 | Reference 1, 147 – 21, 59 |
| Handle/Hand | 6,22 | Reference 1,54-25,15 |

Source: Authors

Employees who also did not practice physical activity reported more pain than those who practiced in the neck region 28 (73.3%); p= 0.039) According to Table 4.

Table 4. Prevalence of musculoskeletal disorders and distribution of

| Sample data | Symptoms | No | | Yes | | Total | | p-value |
|---|---|---|---|---|---|---|---|---|
| | Neck Symptoms | n | % | n | % | n | % | |
| Physical Activity | No | 15 | 65,2% | 8 | 34,8% | 23 | 100% | |
| | Yes | 28 | 90,3% | 3 | 3,0% | 31 | 100% | |
| | Total | 43 | 79,6% | 11 | 20,4% | 54 | 100% | 0,04 |
| | Symptoms in the shoulders | n | % | n | % | n | % | |
| Employee Gender | Male | 30 | 93,8% | 2 | 6,5% | 32 | 100% | |
| | Female | 22 | 73,3% | 8 | 2,7% | 30 | 100% | |
| | Total | 52 | 83,9% | 10 | 16,1% | 62 | 100% | 0,04 |
| | Hand and Wrist Symptoms | n | % | n | % | n | % | |
| Employee Gender | Male | 28 | 90,3% | 3 | 9,7% | 31 | 100% | |
| | Female | 18 | 60% | 12 | 40,0% | 30 | 100% | |
| | Total | 45 | 75,4% | 15 | 24,6% | 61 | 100% | 0,008 |

Source: Authors.

Regarding gender, the prevalence of pain was reported by females (26.7%) compared to males (6.5%) in the shoulder region. In the wrist and hand region, females reported 40% of pain compared to 9.7% of males (p=0.0080).

## DISCUSSION

According to the results obtained, it was possible to know the musculoskeletal symptoms presented by the employees of a private school in Greater São Paulo in 2010.

How to explain, over the years, the growth in the number of cases of musculoskeletal disorders, without the company, the safety engineering and occupational medicine control system, and the INSS having given them the deserved importance (Barbosa, 2012).

In the literature review for the elaboration of this study, it was noted that work-related musculoskeletal problems or disorders have been reported since the year 1700, with the suffering of clerical artisans, through the industrial revolution, with automated and repetitive work, which aimed to increase productivity, without self-control over rhythm, position and mode of work, as well as ergonomically furnishing and equipment (Pastre, et al. 2007).

According to (Medronho, 2002), considering that these measures may be underestimated due to the effect of healthy workers, it is believed that musculoskeletal disorders continue to grow rapidly among the population of workers, and the problem becomes increasingly worrying within the global scenario of occupational health promotion. The healthy worker effect is a type of selection bias in

epidemiological studies that tend to underestimate the occurrence of health problems, as active workers would be healthier and more able to work than those not in the market, precisely because of health problems.

Healthy lifestyle habits directly influence quality of life. The scientific literature and professional practice show the strong relationship between physical well-being, subjective well-being and physical activity, when practiced regularly they provide multiple beneficial effects, neuromuscular, metabolic and psychological.

The choice of the research theme was not only based on history, but also on the frequent musculoskeletal complaints of administrative environments. In fact, the high occurrence of reports of this nature was noted in the findings of the present study and corroborates information from researchers who investigated the subject (Pastre, et al, 2007); (Brandão et al, 2005).

According to (Pastre, et al, 2007); Brandão et al, 2005) from the etiological point of view, it is noted that the highest frequency of these diseases affects young women, aged between 20 and 39 years. The characteristics are similar to those of the participants in this study, so it is possible to have excellent results and control conditions for this investigation.

According to (Silva et al 2004; Maciel et al, 2006). The significant association identified between the female gender and the pain symptomatology is consistent with the results obtained in other studies, and can be explained by the fact that disorders of the musculoskeletal system frequently occur when the physical demands of the work exceed the physical capacity of the worker. In this regard, the difference in muscle mass, body composition and size of women in relation to men may represent, for this group, a predisposing risk factor for painful symptoms (Maciel et al, 2006); (Machado et al, 2023).

The association between musculoskeletal symptoms and gender is also demonstrated in this study with a statistically significant difference, predominating in females, especially in the cervical, shoulder, dorsal and lumbar regions. This higher prevalence in females was also found as a result of other studies. RSI/WMSD affects women much more than men, a fact that can be explained by several factors, including that women are present in the most prevalent occupations, referring to more monotonous and repetitive tasks (Mauro et al, 2003) and, also, that the difference in muscle mass, body composition and size of women in relation to men can represent, for this group, a predisposing risk factor for painful symptoms. It was found, in a study of office workers, that women were more likely to report musculoskeletal symptoms than men (Picoloto et al, 2008).

The prevalence of symptoms of musculoskeletal disorders found in this investigation was high, but close to those described in the literature (Brandão et al, 2005). The questionnaire used was able to assess musculoskeletal disorders, and shows the most affected regions (**Table 3**). These findings are based on the fact that an instrument validated and referred to by several studies was

used, mainly in occupational health, with emphasis on the categories of drivers, nurses, dentists and industrialists (Brandão et al, 2005); (Olafdottir et al, 2000).

According to (Trelha et al. 2002), the prevalence of musculoskeletal symptoms in chekout workers in Londrina, PR, showed a prevalence of musculoskeletal symptoms of 73.2% in the last twelve months, 51.2% in the last seven days, and 21.35% had been absent from work.

Studies carried out with elementary school teachers in the interior of São Paulo found that 90.4% of the population studied had musculoskeletal symptoms in the last twelve months and 64.3% in the last seven days. In this population, almost 100% of the sample was female (Carvalho et al. 2006).

In a survey conducted with professionals in the textile industry in Santa Cruz-RN, 62.3% of the employees reported painful symptoms in more than one location, and it was also reported that 8.6% of the individuals had been absent from work in the last six months for this reason. In this study, 67.3% of the employees were female, most of whom were seamstresses (Carvalho et al. 2006).

In a study carried out with bank employees, in Pelotas – RS the region, the occurrence of musculoskeletal pain was identified in 60% of the interviewees for at least one episode of pain in the last year and 43% in the last seven days. Of the workers interviewed, 19% had to avoid work due to pain in three or more anatomical regions, and 40% were work-related. Regarding gender, 58% of the interviewees were male (Brandão et al. 2005).

The relationship between musculoskeletal symptoms and gender is also demonstrated in this study with a statistically significant difference, predominating in females, especially in the neck, shoulders, upper back, wrist and hand. This higher prevalence in females was also found as a result of other studies (Brandão et al. 2005); (Maciel et 2006).

Labor lawsuits associated with disorders in the lower limbs correspond to less than 10% of the total lawsuits related to musculoskeletal symptoms in most industrialized countries (Carvalho et al. 1998).

RSI/WMSD affects both women and men, this can be explained by several factors, among them, that women are present in the most prevalent occupations, referring to more monotonous and repetitive tasks, and also that the difference in muscle mass, body composition and size of women in relation to men may represent, for this group, a predisposing risk factor for painful symptoms. In a study of office workers, women were more likely to report musculoskeletal symptoms than men were found to be more likely to report musculoskeletal symptoms (Brandão et al. 2005).

Musculoskeletal symptoms were observed more frequently in women, in those who did not practice physical activity, in those who reported their work pace as "accelerated", in those who worked sitting most of the time and in those who classified their work environment as "with

problems", which was also largely consistent with factors found in other studies (Brandão et al. 2005).

According to (Pinheiro et al, 2002), in relation to gender, they showed similar results with a higher prevalence of musculoskeletal pain in women. Authors reported in their research that of the patients with musculoskeletal disorders who sought medical care at the Workers' Health Program in the North Zone of São Paulo, 87% were women.

According to (Brandão et al. 2005) report and discuss the higher prevalence of problems observed in female systems analysts, attributing such differences to factors such as differences in biological responses, work situations, the subjective perception of work in terms of gender, and the intersection between the roles played by women at work and at home.

The working posture can be considered a factor that generates musculoskeletal disorders. Although the analyses carried out here focus on the physical aspects of work, the contributions are in fact important for the full approach of the subject, including the effect of stressful events in the work environment, or even outside it. Such contributions can help to understand not only the occurrence of health problems (Brandão et al. 2005); (Lima et al. 1995); (Barbosa et al, 2023).

Although the analyses carried out here have focused on the physical aspects of work, the contributions of what is called French ergonomics are in fact important for the full approach of the subject, including the effect of stressful sources/events in the work environment, or even outside it. Such contributions can help to understand not only the occurrence of health problems, but also the occurrence of occupational accidents (PINHEIRO et al, 2002).

The generalization of the results should consider the limitations inherent to cross-sectional studies, which use self-administered instruments as a bias of simultaneous measurements, and the possible interference of uncontrolled factors. Even so, it is believed that situations of occupational risk could be identified, which can support actions to prevent and control these diseases, with a view to improving the health conditions of these employees (Pinheiro et al, 2002).

## CONCLUSION

In this study, we can conclude that workers who occupy administrative positions using computers are exposed to physical and psychosocial risk factors, which can be associated with the development of musculoskeletal symptoms and injuries. The high prevalence of symptoms in various body regions among these workers indicates the need for preventive measures to control the development of lesions. Some simple adjustment measures and guidance to workers can contribute to the improvement of symptoms. Future studies in this line of investigation need to be carried out and develop standardization of methods for assessing exposure and the musculoskeletal effect in order to

offer safer means to propose preventive measures for these alterations, which can lead to chronic and disabling diseases.

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