



Perception of RSI/ WMSD risks involved in teleworking among employees at a public university

*Percepção dos riscos de LER/DORT
no teletrabalho de servidores
de uma universidade pública*

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Date of first submission: November 13, 2023

Last received: February 19, 2024

Accepted: February 21, 2024

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Abstract

Introduction: Although teleworking emerged decades before the COVID-19 pandemic, the spread of the virus in 2020 resulted in faster and more widespread implementation of this work format. However, the lack of a dedicated workspace may pose ergonomic risks and increase the incidence of musculoskeletal disorders.

Objective: Understand the risks of repetitive strain injury (RSI) and work-related musculoskeletal disorders (WMSDs) in teleworking from the perspective of employees at a public university. **Methods:** A list of employees at a public university who were full or part-time teleworkers was obtained from the campus Personnel Department and used to select subjects for individual scripted interviews. The interviews were recorded and transcribed for thematic content analysis. **Results:** Eight employees took part in the interviews, most of whom were women, aged between 33 and 64 years and from different professional categories. The interviewees reported ergonomic deficiencies, musculoskeletal symptoms, using individual preventive strategies, and the advantages of teleworking, among others. **Conclusion:** There are still ergonomic-related risks of RSI/WRMDs, and despite changes made during the COVID-19 pandemic, it remains important to comply with preventive needs and improve knowledge management among workers.

Keywords: Occupational health. Musculoskeletal disorders. Physiotherapy. Teleworking. Work conditions.

Resumo

Introdução: O teletrabalho surgiu décadas antes da pandemia. Em 2020, porém, com a propagação do vírus da COVID-19, esse modo de trabalho foi implementado de forma rápida e mais ampla. A falta de um ambiente dedicado ao teletrabalho, contudo, pode promover riscos ergonômicos e conseqüentemente uma maior ocorrência de distúrbios osteomusculares.

Objetivo: Compreender os riscos de lesões por esforços repetitivos (LER) e distúrbios osteomusculares relacionadas ao trabalho (DORT) no teletrabalho a partir da percepção de servidores de uma universidade pública. **Métodos:** Obteve-se uma listagem de servidores da Divisão de Gestão com Pessoas de um campus de uma universidade pública que estavam em teletrabalho (parcial ou total) e selecionaram-se sujeitos para a realização de entrevistas individuais, com base em roteiro elaborado. As entrevistas foram gravadas e transcritas para análise temática de conteúdo. **Resultados:** Participaram das entrevistas oito servidores, a maioria do sexo feminino, com idade entre 33 e 64 anos e de diversas categorias profissionais. Nas entrevistas, surgiram inadequações ergonômicas, sintomas osteomusculares, utilização de estratégias individuais de prevenção, vantagens do teletrabalho, entre outros. **Conclusão:** Ainda existem aspectos ergonômicos de risco para LER/DORT e, apesar das adaptações feitas ao longo da pandemia de COVID-19, ainda há necessidade de atender às necessidades de prevenção e melhorar a gestão de conhecimento para os trabalhadores.

Palavras-chave: Saúde do trabalhador. Distúrbio osteomuscular. Fisioterapia. Teletrabalho. Condições de trabalho.

Introduction

Telecommuting first emerged in the United States during the 1970s oil crisis as a means of alleviating traffic problems and cutting costs by moving the work to the workers rather than the workers to work.¹ However, technological advances in the 1990s prompted an increase in so-called teleworking, especially in developed countries.² The term home office was coined to describe this broader concept of working remotely, also known as teleworking, which involves working offsite from official company offices, full or part-time, with the help of information and communications technology.³ A home office is a specific category in the teleworking context, where employees work at their own homes.⁴

Over the years, working from home (WFH) became common only for certain types of work and/or in occasional situations. However, with the advent of the COVID-19 pandemic, teleworking was implemented abruptly and indefinitely,⁵ significantly increasing the number of people working from home.⁶ In Brazil, according to the National Household Sample Survey (PNAD in Portuguese) conducted during the COVID-19 pandemic, there were 7.3 million teleworkers in November 2020.⁷ At the end of 2020, teleworkers were predominantly college-educated white women, aged between 30 and 39 years, working in the formal sector.⁷

It is important to note that the pandemic required a rapid shift to remote work that gave employees no choice and no time to adapt, and required them to overcome barriers that affect productivity, such as social isolation, work-family conflict, communication difficulties with management and colleagues, and the lack of a dedicated workspace with a suitable desk and chair.⁸ COVID-19 also brought gender-based inequality in the division of domestic chores, with greater demands on women than on men.⁹ As a result, women reported more musculoskeletal symptoms in different parts of the body (upper and lower back, neck, wrists, and hands), taking fewer breaks and not having a “designated workspace”.¹⁰

As teleworking in improvised offices increased, so did the risk of discomfort and musculoskeletal disorders (MSDs).¹¹ Repetitive strain injury (RSI) and work-related musculoskeletal disorders (WMSDs) affect muscles, tendons, fasciae, ligaments, and nerves, and the excessive load on the musculoskeletal system and lack of time for recovery result in a multifactorial etiology.¹² RSI/WMSDs are a direct result of repeated movement, poor posture, overexertion, excess loads and insufficient rest, which are exacerbated in a problematic psychosocial environment, particularly in relation to work stress.¹³

The effect of MSDs and the consequent decline in employee health on productivity and a country's economy make it important to understand the causes in order to establish more effective preventive strategies.¹⁴ The increase in painful symptoms may be linked to the lack of ergonomically adequate workstations, which contribute to postural discomfort.¹⁵ The absence of a dedicated workspace was associated with greater ergonomic and psychosocial risks and, consequently, a higher incidence of MSDs.¹⁶ Ergonomic risks are the main cause of MSDs and include repeated movement, overexertion, poor posture, prolonged sitting, screen height, and inadequate desk and chairs.¹⁷

The main risks to teleworkers' health are the unavailability of ergonomic equipment and a dedicated workstation, as well as the risk of overwork and psychosocial implications.¹⁸ Moreover, the failure of companies to provide adequate infrastructure and technological resources may heighten the ergonomic risks of teleworkers.¹⁹ Neck, shoulder and back pain may be associated with several factors, including sex, age, height, work duration, type of device used, seat and keyboard height, and habits such as smoking/drinking and insufficient physical activity.²⁰

Work-related musculoskeletal disorders (WMSDs) are also often complicated by psychosocial factors, such as work control and low job satisfaction and security, which can exacerbate mechanical overload, resulting in more severe cases.¹⁴ Psychosocial risks are related to stress, lack of an appropriate workspace and inappropriate organizational conditions, communication difficulties and demotivation, with the potential to trigger physical and mental illness.²¹ An ergonomic workstation is recommended to prevent physical and mental stress. Additionally, well-organized work time and a clear separation between one's professional and private lives are essential to promote the health of remote workers.²²

The aim of this study was to understand the RSI/WMSDs risks involved in teleworking from the perspective of employees at a public university.

Methods

This was an exploratory descriptive qualitative study, conducted in 2022 in two stages. In the first, the office of the director of a public university in São Paulo state was contacted to authorize the study, and a list of teleworking administrators and technical staff in educational issues was obtained. The inclusion criterion was being a full or part-time teleworker for at least 12 months.

In the second stage, all the employees on the list were emailed and invited to participate in the study via an individual interview on Google Meet, based on a script previously compiled by a specialist in the field of occupational health/ergonomics. All the participants were volunteers.

The interviews lasted 60 minutes and were recorded and transcribed in full for thematic content analysis,²³ which was performed in the following stages: pre-analysis, by skim reading the text and organizing initial ideas; in-depth analysis, coding and applying the findings from the previous stage; and interpreting the

content obtained.²³ The recording units identified were organized into thematic categories for discussion and analysis.

The study was approved by the Research Ethics Committee of the Federal University of São Paulo under the protocol numbers 0948/2022 and CAEE 64099222.0.0000.5505.

Results and discussion

During the study period, after the pandemic, 38 employees engaged in teleworking (full or part-time) were identified. Of these, eight participated in the interviews. Some were not interested or unable to take part, while others were on vacation or medical leave. Most were women ($n = 6$), aged between 33 and 64 years, had worked at the university for more than five years ($n = 7$) and were part-time teleworkers ($n = 7$). Part-time teleworking involved some in-person activities once or twice a week.

The interviewees were from the following professional categories: executive secretary ($n = 2$), nutritionist ($n = 1$), administrative educational technician ($n = 2$), administrator ($n = 1$) administrative assistant ($n = 2$).

The interviews were analyzed, and the following thematic categories identified: ergonomic inadequacies and musculoskeletal symptoms; work organization and stress; workstations during and after the pandemic. For ethical reasons and to keep participants' identity confidential, they were identified as a man or woman and assigned a number (woman 1 = W1, man 1 = M1, etc.). Table 1 describes the recording units assigned to each category.

Table 1 - Categories and recording units

Category	Recording units
Ergonomic inadequacies and musculoskeletal symptoms	Laptop use, improvised workstation, unsuitable office furniture (chair, desk, keyboard, and mouse), inadequate equipment use (laptop), lack of breaks and preventive strategies.
Work organization and stress	Difficulty communicating with senior management, working overtime, disorganized work routine, impacts of gender differences (especially women, mothers).
Workstations during and after the pandemic	Lack of prior adjustment, ergonomic information/knowledge and financial contributions from companies.

Ergonomic inadequacies and musculoskeletal symptoms

The participants teleworked from home, but not always in ideal physical and ergonomic conditions.

Well, actually, I work right here, in the living room, it's quite a busy little corner (laughs) I've managed to adapt it fairly well... I have my own computer, you know, that only I use! (W1)

I don't have an office, I live with my partner, who also works for a public institution... he works in a bedroom and I'm in the living room (...) the furniture bothers me yes... but... it's the best we can do at the moment unfortunately! (W2)

During the COVID-19 pandemic, all the interviewees experienced adjustments to their workstations at home, and concerns about these adaptations remained after the pandemic because the teleworking format was maintained. However, not all the adjustments were possible since they involved financial costs and lack of knowledge about health-related concerns, with one problem identified by participants being the lack of a proper office and furniture at home.

The female participants whose husbands were also teleworkers worked in a variety of locations, relinquishing perhaps more suitable areas in favor of their husbands. These gender-based inequalities related to work already existed before the pandemic.²⁴ Teleworking women tend to divide their time between household chores and work, while men concentrate more on their professional tasks in a space geared solely towards teleworking and with fewer interruptions.²⁵

In regard to office furniture, using a nonergonomic chair was the most cited topic among the interviewees, along with a sense of outrage at having to bear the cost of ergonomic equipment.

What bothers me about work is the issue of a suitable chair, which I still don't have... of course, when we sign the terms and conditions for teleworking, we always agree that we'll make do... (M3)

The public institution in question published an ordinance advising that employees would be responsible for the ergonomics of their workstations at home, causing

feelings of outrage and indignation at having to bear the costs involved and at the university's failure to cover the costs of an internet connection, electricity, phone bills and any other expenses incurred for work-related activities. The lack of a designated noise-free work area with suitable furniture, temperature and lighting, as well as privacy, are responsible for the increase in MSDs in teleworkers.²⁶ Companies that adopt teleworking should be mindful of employees' working conditions at home, including their workload, and offer the necessary support, thus preventing the occurrence of MSDs.¹⁶ It should be noted that not all teleworkers have a suitable chair, desk or lighting in their workspace at home.

The ideal chair should be comfortable and cushioned, with adjustable arms that allow the elbows to remain relaxed at 90° and ensure the correct posture in relation to the desk. The backrest and chair height should also be adjustable so that the feet are flat on the floor and the hips remain at 90°.²⁷ Additionally, if the feet are not flat on the floor, enabling the hips to remain at the appropriate angle, a footrest is also recommended.²⁷

The interviewees also stated that the time spent sitting while working (for the women) caused low back pain.

If I spent eight straight hours sitting in front of my computer it wouldn't work... I already have a persistent pain in my lower back... (M1)

Prolonged sitting may pose a risk in terms of increasing musculoskeletal symptoms, such as low back pain,²⁸ and is an important ergonomic factor that may be associated with a greater incidence of these symptoms, particularly when seated in an unsuitable chair and with incorrect posture.²⁸

Most of the interviewees frequently used laptops and reported painful musculoskeletal symptoms.

I use a laptop, and that's where it gets complicated, in terms of screen height, because you can't change it so you end up looking down... maybe that's why I have neck pain. (W4)

Prolonged sitting combined with laptop use resulted in neck pain.

When I spend a lot of time on my laptop, I end up feeling this muscle here a lot more... the trapezius... (M1)

Inadequate laptop use may favor the emergence of neuromuscular pain, and participants who used these devices did not use an external keyboard. Screens should ideally be 50 to 100 cm away and positioned at eye height. In the case of laptops, an external keyboard and cordless mouse should be used to prevent neck flexion, extension or rotation and leaning forward, which could cause MSDs.²⁷ With prolonged sitting and the lack of a suitable workstation, some employees reported taking more breaks as a strategy to prevent pain.

I take breaks, and I don't feel guilty about it, if only to avoid sitting for too long... (W1)

I take a lot of meal breaks during the day, so I end up... for example, I have breakfast at 7 a.m., and then I eat again at 10 a.m., I make sure I get up, go into the kitchen, get something to eat, and so on... (W5)

Others, however, report that they only take breaks when uncomfortable or in pain.

I stop when I'm in pain, not because "it's the right thing to stop (take a break) every 50 minutes"... it's nothing like that... (W4)

Taking breaks may be ambiguous because some participants were better organized and able to rest more often, while others only took short breaks for meals (lunch) and when they felt uncomfortable. Breaks are important to relieve muscle tension, reduce the monotony of repetitive tasks, restore concentration and relieve stress.²⁹ Failing to take regular breaks can increase the risk of physical and psychological fatigue and even cause insomnia.³⁰ Thus, organizations need to ensure that employees take breaks to protect their physical and psychological health and avoid overwork.²⁶ However, the heavy workload on some days prevented staff from that taking regular breaks.

Some days I take more breaks and on others, none at all, it's just not possible, with the exception of meals of course... (M2)

In order to minimize discomfort, and although not formally planned, participants adopted preventive strategies by taking breaks (when possible), stretching, and adjusting their posture.

I like to stretch... if I'm in the middle of a meeting and something starts hurting, I do some stretches, I turn off the camera and adjust my posture, but that's about it, stretching and moving around to sort of... improve my posture and such... (M1)

Stretching and joint mobilization are strategies to relieve neck and back pain, along with sport and physical exercises.³¹ The strategy of incorporating physical activity into everyday activities was also reported by some of the women interviewed.

I was in pain for a month and didn't know what it was (...) so I started exercising regularly to feel better... (W3)

I exercise... I go to the gym at least 3 times a week (W1)

Physical exercise has a number of benefits for the body, contributing to reducing stress and improving cognitive abilities, sleep quality, cardiovascular and lung function, muscle strength and mass, as well as the immune system.³² Those who incorporated exercise into their daily routine noted that this reduced or prevented musculoskeletal complaints.

Work organization and stress

Participants reported that senior management had approaches to task organization, which generated difficulties. A common issue that caused conflict was communication failures. Staff were expected to respond rapidly to requests made via WhatsApp, but management did not necessarily reciprocate in the event of uncertainty or other needs.

It can be difficult sometimes because he (management) doesn't respond... So, I think sometimes communication can be a problem when you're working remotely, you know? (M1)

The habit of communicating via WhatsApp has increased exponentially among work colleagues, but not everyone is quick to respond, which often delays task completion. Moreover, responses often arrive outside working hours, meaning employees are expected to be available beyond their established work schedule.

I'm always on my phone, answering a WhatsApp or something... I don't know... sometimes well outside my working hours... they even message me at night! (W4)

Nowadays, with cell phones, people share your contact details, and that can become a problem... I've even been messaged at 1 a.m.! (W5)

Both receiving messages, outside work hours and the failure of managers to respond quickly to questions or solve problems were cited as stressors by interviewees. Additionally, meeting overload or meetings outside office hours make it difficult for most staff to establish a well-defined work schedule, affecting meal breaks and making work more tiring and stressful than in an in-person setting.

Some days I don't have time for lunch... like today! But I'll snack on junk food... I have to admit that things are more organized working in the office. (W2)

It's literally one after the other (meetings), sometimes I've just finished in one and I have to start another... There's no set routine, you know? It's tiring... (M2)

Organizational difficulties in teleworking begin with a vicious cycle of excessive demands and different work schedules between managers and staff, since this work format allows for flexibility in adjusting individual working hours. Although evidence on psychosocial factors is heterogeneous, teleworking implemented during the pandemic prompted an increase in complaints of work-related stress, anxiety, depression and psychological suffering.³³ Organizational aspects associated with ergonomic and psychosocial factors may increase the incidence of MSDs.³⁴

The support of leadership and smoother communication with colleagues and management may improve motivation in remote workers.³⁵ It is important to establish a relationship of trust with staff in order to consolidate effective virtual teams, thereby achieving organizational objectives while safeguarding employee welfare.³⁶ On the other hand, self-leadership should also be considered an important resource in telework, and may be linked to better productivity and performance.³⁷

Another stressor for most of the women interviewed was working at home alongside family duties. Women with small children found it particularly difficult to separate work from family in a domestic setting, meaning that everyday organization revolved around their children's schedule, despite causing distractions.

The television's always on... you know kids... Depending on what I'm doing, I sometimes join them for a while... I get distracted, lose focus. (W4)

In the beginning I had more control, a couple of months ago, because... I'd close the door, but now it's always being opened (laughs), they're always coming in ... (W6)

Establishing a work routine is especially difficult for women with young children, causing fatigue, stress, and excessive workloads. In teleworking, domestic responsibilities typically fall to women, who must work while looking after the home and children, all in the same space.³⁸ For women, difficulty separating their professional and personal lives, overwork and excessive responsibilities have a negative impact on their health, with a greater risk of emotional exhaustion and burnout.³⁹ Given the possible continuation of teleworking, it will be up to employers to provide organizational resources for the adjustments needed to prevent overwork and stress.

Workstations during and after the pandemic

The participants reported that workstation changes were needed both at the beginning and after the pandemic. The sudden shift to remote work and the lack of information and uncertainty when in-person work would resume meant that some interviewees felt unprepared for working from home. Given their belief, at the start of the pandemic, that remote work would last only a few months, participants initially opted not to invest in office furniture and equipment.

We never imagined that this would actually become our official workplace. Our work routine... (W4)

I think it took me about... I don't know, six months to properly adapt my workspace (...) it was only in September or October that I really accommodated myself somewhere, and that became my workstation, you know? (M1)

Some participants did not have their own office, a proper desk or even their own laptop or desktop computer.

I had so many meetings while sitting on a stool in the kitchen... it just wasn't comfortable, you know? (W1)

We just weren't properly equipped at home, so I used the dining room table for meetings, and to work. (W2)

However, over time, they adjusted their workstations, within their respective possibilities and circumstances.

We managed to address the issue of office furniture... it's not fully resolved, but I think it's better. (W4)

I bought a desk two or three months ago because my computer was on the dining room table before that. (W1)

The sudden shift to teleworking during the COVID-19 pandemic made it difficult to organize and adapt workstations to domestic settings. Working remotely also posed considerable challenges for employees, such as the lack of a designated workspace at home.⁴⁰ In a study with university faculty and staff, even after nine months of teleworking, employees continued to use laptops without making the appropriate ergonomic adjustments, contributing to the emergence of MSDs.⁴¹ In the present study, lack of information and knowledge about ergonomic issues prompted some participants to invest in unsuitable office furniture or inadequate adaptations.

Because of lack of training, not knowing about ergonometry (ergonomics)... we ended up buying the wrong things, the wrong furniture! (W2)

Despite making adaptations, in some cases employees had no knowledge of ergonomics. There are few studies on educating remote workers about changes to this work format over time.⁴² It is important to note that teleworking existed before the COVID-19 pandemic, which accelerated its use,⁴⁰ and it is expected to continue indefinitely.

Limitations of the present study are the small sample, since all participants were from the same campus, and the dearth of qualitative research on the risks of work-related musculoskeletal disorders.

Conclusion

The employees studied here reported difficulties in ergonomically adapting their workstations at home and using unsuitable equipment, particularly desks and chairs, which are risk factors for musculoskeletal disorders. There were also complaints about prolonged sitting and difficulty taking breaks. The main strategy used by most participants to relieve muscle tension was stretching, while others exercised as a form of prevention.

The abrupt change to remote work without prior organization compromised communication, led to meeting overload and meetings outside work hours. In regard to workstations, participants found it difficult to bear the financial cost of creating a designated workspace with a proper desk and chair, and lack of information on ergonomics.

Due to the previously mentioned limitations and the different family, social and economic contexts involved, we were unable to draw a definitive conclusion regarding the risks of RSI/WRMDs in university staff, and difficulties adjusting to telework during the pandemic and to date. However, the results obtained raise important questions for prevention and future research. Studies on the topic should be encouraged in order to increase visibility regarding remote work and the health and well-being of employees.

Authors' contributions

Both authors were responsible for designing the study, collecting and interpreting the data, writing and reviewing the article, and approving the final version.

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