Sex differences in the impact of musculoskeletal disorders on health-related quality of life: a population-based study, Campinas, SP – ISACamp 2014/15

Diferenças entre os sexos no impacto das doenças musculoesqueléticas na qualidade de vida relacionada à saúde: estudo de base populacional, Campinas, SP – ISACamp 2014/15

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Abstract This article aims to estimate the prevalence of musculoskeletal disorders (MD) on the adult population of Campinas, São Paulo, Brazil, verifying associated demographic and socioeconomic factors, and to analyze their impact on Health-Related Quality of Life (HRQoL) according to sex. A population-based study was conducted with 2,166 individuals using data from the ISACamp 2014/15. The Medical Outcomes Study SF-36 Item Short Form Health Survey (SF-36) was used to measure HRQoL according to MD. Prevalence ratios (PR) were estimated by Poisson regression. Musculoskeletal disorders had a prevalence of 8.5% (6.7% tendonitis and 2.7% work-related musculoskeletal disorders – WMSD). Results showed a higher prevalence of musculoskeletal disorders in women, active or on leave due to illness, and in individuals with higher education levels. Moreover, reduced HRQoL scores were observed in 6 of the 8 domains, due to MD. The mental component and physical component showed greater impairment respectively among women and men after self-reported WMSD. These findings point to substantial damage from musculoskeletal disorders on the population’s HRQoL. WMSD affect the HRQoL of men and women distinctly.

Key words Musculoskeletal disorders, Sex characteristics, Quality of life

Resumo O objetivo deste artigo é estimar a prevalência de doenças musculoesqueléticas (DM) na população adulta de Campinas/SP, Brasil, verificar fatores demográficos e socioeconômicos associados e analisar o seu impacto na qualidade de vida relacionada à saúde (QVRS) segundo sexo. Este é um estudo de base populacional utilizando dados do ISACamp 2014/15, com 2.166 indivíduos. Para a medida de QVRS, foram calculados os escores médios do Short Form Health Survey 36 (SF-36) segundo as DM e utilizada a regressão de Poisson para estimar as razões de prevalência (RP). A prevalência de DM foi de 8,5% (6,7% de tendinite e 2,7% de doenças osteomusculares relacionadas ao trabalho – DORT). Os resultados deste estudo mostraram maior prevalência de DM em mulheres, na população adulta ativa ou afastada por doença e em indivíduos com maior escolaridade. Além disso, observou-se redução nos escores de QVRS, devido às DM, em quase todos os domínios do instrumento. O maior comprometimento foi observado no componente mental entre as mulheres, e no componente físico, entre os homens, após autorrelato de DORT. Os achados mostram o impacto substancial das DM na QVRS da população. As DORT afetam distintamente a QVRS de homens e mulheres.

Palavras-chave Doenças musculoesqueléticas, Diferenças sexuais, Qualidade de vida
Introduction

As the second most common cause of disability worldwide, musculoskeletal disorders (MD) lead to a considerable increase in costs for employers and healthcare systems. They remain a great burden for developing countries, where health budgets are already restricted and most often allocated to life-threatening conditions. In Brazil, MD are not commonly targeted by epidemiological studies, making estimates of their prevalence and impact on the community scarce.

According to the Brazilian Ministry of Health Protocol (Ministério da Saúde – 2012), work-related musculoskeletal disorders (WMSD) "are characterized by the occurrence of various symptoms, concomitant or not, of insidious onset, usually on the upper limbs, such as pain, paresthesia, heaviness and fatigue". Tendinopathy consists of inflammation of one or more tendons, including rotator cuff injuries, which is a major complaint reported by workers, significantly affecting work functionality. Repetition, inadequate work environment, little task variability, reduced rest time and high psychosocial demands are the main factors that favor the development of WMSD.

Musculoskeletal disorders involve inflammatory and degenerative phenomena in various structures (muscles, nerves, tendons, fascia, ligaments, joints, bones), resulting in pain, reduced mobility and social participation, with significant damage to the working population’s quality of life, and impairment of their physical and mental health.

Health-related quality of life (HRQoL) is a health status measure of great relevance to understand how diseases affect different health dimensions, revealing their impact on people’s daily lives. Studies on the impairment caused by MD on HRQoL are scarce. A Dutch population-based study on the association of 12 diseases with HRQoL, including tendonitis and work-related musculoskeletal disorders, demonstrated that the population subgroup affected by these disorders presented significantly lower scores in all the Short Form Health Survey 36 (SF-36) dimensions, especially regarding the physical aspects.

According to 2013 National Health Survey (Pesquisa Nacional de Saúde – PNS 2013), the prevalence of musculoskeletal disorders in Brazil was found to be 2.5%. Additionally, a previous study based on data from the 1998 National Household Sample Survey (Pesquisa Nacional por Amostra de Domicílios – PNAD) reported a prevalence of 3.1%. Notably, the highest prevalence was observed among women.

Women generally report more musculoskeletal symptoms. Although men are more likely to be injured or die on the job, women have greater chances of suffering cumulative injuries, such as musculoskeletal disorders. When analyzing exposure by sex, studies show greater exposure to tiring and painful positions, in addition to repetitive movements. It remains unclear why, with similar levels of exposure, women report higher levels of musculoskeletal disorders. Collins and O’Sullivan explain this finding by the combination of physical and psychosocial risks.

According to Oxfam Brasil (2018), little is said about the importance of women’s work in a country where they represent 50.7% of the population. In turn, female participation in the most valued occupations is vastly different from their demographic representativeness. Sexism in the workplace tends to lead women towards lower-skilled positions and greater risk of injury. Conversely, men are more vulnerable to serious and chronic diseases, in addition to higher rates of early mortality, risky behaviors and lower demand for health services. The path to preventing injuries among men and women may thus differ, demonstrating the need for sex-specific research to facilitate the creation of more effective health protection and promotion strategies aiming at the various dimensions of well-being.

We found no Brazilian population-based studies that assess the impact of musculoskeletal disorders on HRQoL according to sex differences. Thus, this study estimates the prevalence of these musculoskeletal disorders on the adult population of Campinas, São Paulo (ISACamp 2014/15), Brazil, to verify associated demographic and socioeconomic factors, as well as to analyze their impact on the different HRQoL domains according to sex.

Methods

Study design and target population

A cross-sectional population-based study was conducted using data from the "Campinas City Health Survey (Inquérito de Saúde do Município de Campinas – ISACamp 2014/15)" developed by the Collaborating Center on Health Situation Analysis (Centro Colaborador em Análise de Situação de Saúde – CCAS) of the Department
of Collective Health at the University of Campinas (UNICAMP). This survey sought to monitor the health status of the Campinas population and the main social trends and inequalities in various health and disease aspects. Located in Southeastern Brazil, within the state of São Paulo, Campinas had 1,194,094 inhabitants in 2018, and a Human Development Index (HDI) of 0.805 (2010).

Although the research included three subpopulations—adolescents (10 to 19 years), adults (20 to 59 years) and older adults (60 years or older)—only information from individuals 18 years and older was analyzed. Interviews were conducted with the non-institutionalized population living in private households located in the urban area of Campinas.

**Sampling process**

ISACamp 2014/15 has a complex sampling design. The study sample was obtained by cluster probabilistic procedures divided into two stages: census tracts and households. First, we stratified the population into five regions: north, northwest, east, southwest and south, corresponding to the city's health districts. Fourteen census tracts were then drawn from each region considering the probability proportional to size (number of households), totaling 70 sample units, and then the list of households in each sector was updated.

On the second stage, we performed a systematic drawing of households for each sector drawn. We calculated the number of households to be visited by the expected average number of people in each household (people/household ratio) belonging to each age group, based on the 2010 Census. Subsequently, we divided the sample sizes in each age group (in each district) by the respective people/household ratios. Sample size was obtained considering $P = 50\%$ (corresponding to the maximum variability), 95% confidence interval ($z = 1.96$), sampling error of 4% and 5% and design effect equal to 2, resulting in 1,000 people for the age group of adolescents and older adults and 1,400 for adults. A larger number of households were drawn to reach an adequate sample size, considering possible nonresponses. ISACamp 2008/09 predicted nonresponse rates of 27% for adolescents, 22% for adults and 20% for older adults, thus the final number of households selected for interview was 3,119 (adolescents), 1,029 (adults) and 3,157 (older adults). We opted not to perform intra-residence selection, since this type of design has similar accuracy and is less expensive compared with selecting one respondent by household. Thus, we decided to interview all residents in the specific age group for that residence. Home visits took place between December 2013 and August 2015. We interviewed 80.9% of the selected individuals, with the highest percentage of refusals among adults and the lowest among adolescents.

**Data collection instrument**

The questionnaire used for data collection consisted of 13 thematic blocks with closed-questions and predefined alternatives: list of residents of the randomly selected households (block A), control sheet (block B), morbidity, chronic disease and disabilities (block C), accidents and violence (block D), emotional health (block E), health and well-being (block F), use of services (block G), preventive practices (block H), immunization (block I), use of medication (block J), health-related behaviors (block K), socioeconomic characteristics (block L) and family and household characteristics (block M). Only blocks C, F and L were used in the present analysis. Data were collected by trained interviewers using tablet and by direct interview with the selected individual.

**Variables analyzed**

Presence of musculoskeletal disorders was the dependent variable, obtained by the following question: “Have you ever been diagnosed with tendonitis, repetitive strain injury (RSI) or work-related musculoskeletal disorder (WMSD)?” (yes or no response). To differentiate between individuals diagnosed with tendonitis and RSI/WMSD, we included the additional question: “Which of these disorders do you have?” to which they could answer “Tendonitis,” “RSI” or “WMSD.” Responses for RSI and WMSD were grouped (WMSD), as they are different terms for the same set of disorders. “WMSD” analysis included those who answered “RSI” or “WMSD” but who could also have answered “tendonitis.” “Tendonitis” was analyzed considering those who answered only for this disease.

The set of independent variables was selected as follows:

- Demographic and socioeconomic factors: sex (male or female), age group (18-39 years; 40-59 years or 60 or older), race/color (black, white, other – yellow or indigenous), work situation (active, unemployed, on sick leave, active but retired, retired or homemaker), health insur-
dance (yes or no), per capita family income (less than 1 minimum wage, 1 to 3 minimum wages or greater than 3 minimum wages), and schooling (0 to 4 years, 5 to 11 years or 12 years and over). HRQoL was measured using The Medical Outcomes Study SF-36-Item Short Form Health Survey (SF-36), an instrument that aims to detect clinically and socially relevant differences in the health status of both the general population and people with a disease\textsuperscript{28}. It was translated and validated in Brazil\textsuperscript{29}, and had its population-based validity tested by Laguardia \textit{et al.}\textsuperscript{30}. Research has found a high validity and reliability of its scales\textsuperscript{28,31,32}. SF-36 is a 36-item instrument divided into 8 domains: physical functioning, physical role, pain, general health, vitality, emotional role, social functioning, and mental health. The results of each domain are translated into a 0-100 scale, where zero represents the worst quality of life and one hundred the best\textsuperscript{28}. We calculated two summary measures: the physical component and the mental component\textsuperscript{28}, which provide greater accuracy and reduce the number of statistical comparisons required. Component scores were obtained using the average scores for the Campinas population, according to the manual. Association of these disorders with HRQoL was verified by considering the eight domains and the two SF-36 components composed as dependent variables, and the presence of musculoskeletal disorders as the main independent variable.

\textbf{Data analysis}

Considering the weights of the complex sampling design and nonresponse, data analysis was performed using the STATA 14.0 software on survey module (svy) (Stata Corp., College Station, United States). We calculated the prevalence of musculoskeletal disorders, and tested associations with demographic and socioeconomic variables using the chi-square test, considered statistically significant when $p < 0.05$. Crude and adjusted prevalence ratios and the respective confidence intervals were estimated by simple and multiple Poisson regression.

We calculated the averages of SF-36 scores, standard error and confidence intervals for each of the domains and components, and tested associations according to the musculoskeletal variables. Beta coefficients were calculated using simple and multiple linear regression models for each of the instrument’s domains and components. The variables sex, age, number of chronic diseases and schooling were included to adjust for potential confounders, considering that these variables are associated, both, with musculoskeletal disease\textsuperscript{3,4,15,16} and HRQoL\textsuperscript{27,33}. Data analysis was conducted for the total population and stratified by sex. Model fit was verified by residue analysis, and the results found were satisfactory for most associations.

\textbf{Ethical approval}

All procedures were conducted according to the ethical standards of the Research Ethics Committee at the University of Campinas (UNICAMP) under protocol No. 3.655.912 of 10/22/2019 (CAAE: 22435419.5.0000.5404) and the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

\textbf{Results}

After drawing the households, we had 7.4% refusals and 4.4% other losses. Among the individuals available to answer the questionnaire, there were 20.5% of refusals and 1.9% of other losses. Of the 2,178 individuals aged 18 years or older interviewed, 12 did not answer the question about musculoskeletal disorders and were excluded from the study, totaling a sample of 2,166 participants, of whom 56.7% were women aged 44 years on average (± 0.7) and 43.3% men aged 41.8 years on average (± 0.8). Table 1 presents the general characteristics of the study population.

Prevalence of musculoskeletal disorders was 8.5% ($n = 165$) (8.8% for those aged 18 to 59 years and 6.7% for those aged 60 or over), of which 6.7% ($n = 136$) tendonitis and 2.7% ($n = 44$) WMSD. We found a 6.9% prevalence of tendonitis in adults (18 to 59 years old) and 3.1% of WMSD in this population. Of those diagnosed with WMSD, 38.6% ($n = 17$) had tendonitis. After adjustments, the prevalence of musculoskeletal disorders was significantly higher in women (11%) than in men (5.7%; 95%CI: 1.3-2.6), especially those aged 40 to 59 years (3.6; 95%CI: 2.3-5.8), active (2.0; 95%CI: 1.1-3.7) or on sick leave (7.1; 95%CI: 2.8-18.0), with high schooling level (2.4; 95%CI: 1.3-4.7) (Table 2). Among the male population with WMSD, 75% worked on the manufacturing and construction industries, whereas 45.8% of women worked on the service sector such as babysitter, cook, cleaner and hairdresser.

Individuals who reported the musculoskeletal disease analyzed had low scores in all SF-36 domains. Adjusted analysis found a statistically
significant association in six of the eight domains evaluated, with substantial impact on pain, physical role and vitality (Table 3).

Table 4 shows that individuals with musculoskeletal disorders tended to have decreased scored on the physical and mental components. However, when stratifying by sex, women had greater impaired mental health component, with 5.4 points, due to WMSD. For men, in turn, the impact of WMSD is observed on the physical component ($p < 0.05$). We observed no sex differences in tendonitis.

**Discussion**

Our results showed a higher prevalence of musculoskeletal disorders in women, active or on leave due to illness, and in individuals with higher education levels. Moreover, we observed reduced HRQoL scores due to musculoskeletal disorders in almost all SF-36 domains. The mental component and physical component showed greater impairment respectively among women and men after self-reported WMSD.

Data analysis showed a 8.5% prevalence of musculoskeletal disorders on the population, of which 2.7% WMSD (3.1% from 18-59 years old) and 6.7% tendonitis (6.9% from 18 to 59 years old). A study by Hofelmann *et al.* in Southern Brazil found a 17.8% prevalence of tendonitis in adults (20-59 years old). Conversely, Frazão *et al.*, observed a prevalence of 3.1% (25-65 years old). Regarding WMSD, national studies found a 2.5% prevalence among Brazilian adults and older adults. Authors in the United States and in the Netherlands have also found similar results.
Higher WMSD prevalence can be observed in bank workers (30% in a sample of 395 individuals)\textsuperscript{36} and nurses (35% in a sample of 6,070 participants)\textsuperscript{37}. Studies on specific professions are numerous and necessary, but do not present information on the general population\textsuperscript{34}, besides being subject to the healthy worker effect bias.

The musculoskeletal disorders evaluated were more commonly self-reported by women than by men, a finding consistent with previous national\textsuperscript{15,33} and international\textsuperscript{17,38} studies. Research shows that women are more likely to execute tasks with low control over work, low decision-making and autonomy, pressure, reduced mobility and repetitive movements\textsuperscript{23,24,39}. Moreover, we must consider the combination of work outside home with housework\textsuperscript{20} and, consequently, a shorter time for injury recovery\textsuperscript{40}.

Musculoskeletal disorders showed greater prevalence in active people, finding corroborated by some authors\textsuperscript{4,15}. This prevalence tends to increase with age, and by the age of 30, most people have already experienced their first WMSD episode, commonly in the form of back pain\textsuperscript{10}. According to the European Risk Observatory Report\textsuperscript{20}, further research is needed to explain whether this is due to most individuals starting their professional life with previous musculoskeletal disorders or to the rapid development of musculoskeletal diseases after starting work. Moreover, the high prevalence of sick leave found in the present study confirms their disabling character.

Individuals with high schooling level presented higher WMSD prevalence. Other population-based Brazilian studies corroborate this result\textsuperscript{4,15}, which may be explained by greater labor performance and greater awareness of the risks inherent to repetitive tasks, which may lead to greater access to diagnoses. Individuals with lower educational background may also present high prevalence, especially in high physical overload professions such as builders, painters, hairdressers, among others. However, the informality and higher risk of unemployment of such occupations hinder the diagnose and association of the disease with work. A study by Malta et al.\textsuperscript{41} observed that the low schooling level and lack of private health insurance increase the prevalence of functional limitations.

As for the impact of MD on HRQoL, people diagnosed with musculoskeletal diseases showed a statistically significant decrease in six of the eight SF-36 domains, with substantial impact on pain, physical role and vitality. Vitality, which includes feelings of energy, exhaustion, tiredness, and whether a person feels “full of life” or “willful”\textsuperscript{42}, is an important HRQoL dimension and impacts on this dimension substantially upsets an individual’s well-being. A population-based study conducted in the Netherlands showed that people who reported a diagnosis of repetitive strain injury and tendonitis had significantly lower scores in all SF-36 dimensions compared with the non-affected group, especially for phys-
ical functioning, physical role and pain. Other studies on different musculoskeletal disorders evaluated by the SF-36 have also found severe impact on HRQoL. Although WMSD may include tendonitis, we opted to analyze these conditions separately because some participants with tendonitis may not be diagnosed with a work-related disorder. By involving the work situation, diagnosis shows that psychosocial factors have often been associated with WMSD onset. A recent systematic review showed that monotonous work and low social support are antecedents of musculoskeletal disorders, with odds ratio (OR) ranging from 1.1 to 1.6. Emotionally suffering permeates the workers’ trajectory of sickness, from needing to prove the existence of symptoms and illness to employers, family members, health services or Social Security, to experiencing bullying, disqualification, isolation, power abuse, and other acts considered “invisible,” which leads to depression, anxiety, sleep disorders, post-traumatic stress, among others. Oxfam’s report “Women’s Economic Empowerment in Brazil” shows that, in addition to their potential work hours outside the home, women spend 18 hours a week on average caring for others or doing domestic chores, compared with just 10 hours a week for men, fact that justifies, along with physical exhaustion and mental tiredness related to the exhaustive double burden. When exposure occurs both at home and at work, recovery time is reduced, leading to a pathological process that can manifest as a WMSD.

Another important finding of the present study shows that women with WMSD had lower scores in the HRQoL mental component, whereas men presented low scores in the physical component. Recent research found that women had a high prevalence of anxiety disorders and depression due to musculoskeletal injury. Collins and O’Sullivan observed a greater number of statistically significant associations between musculoskeletal diseases and high work demands, unfavorable work environment, and job content among women. Some of the mechanisms suggested to explain this association involve high work demands and mental loads, which increase muscle tension and decrease micropauses in muscle activity; changes induced by stress in the immune and inflammatory systems and greater activation of the medullary sympathetic-adrenal system in response to stress, which provides greater noradrenaline secretion and increases muscle activity.

Emotional suffering permeates the workers’ trajectory of sickness, from needing to prove the existence of symptoms and illness to employers, family members, health services or Social Security, to experiencing bullying, disqualification, isolation, power abuse, and other acts considered “invisible,” which leads to depression, anxiety, sleep disorders, post-traumatic stress, among others. Oxfam’s report “Women’s Economic Empowerment in Brazil” shows that, in addition to their potential work hours outside the home, women spend 18 hours a week on average caring for others or doing domestic chores, compared with just 10 hours a week for men, fact that justifies, along with physical exhaustion and mental tiredness related to the exhaustive double burden. When exposure occurs both at home and at work, recovery time is reduced, leading to a pathological process that can manifest as a WMSD.

Conversely, men presented significant impairment in the HRQoL physical component, with physical role and pain having the lowest scores. Gender differences in pain perception and tolerance remains a contentious topic in the literature. While Budó et al. reported a greater tolerance to pain by women after experiences such as menstrual cramps or labor, culturally, men tend to “naturalize” pain and avoid health care and rehabilitation, seeking help only when necessary.

### Table 3. Average SF-36 scores according to the presence of musculoskeletal diseases and gross and adjusted beta coefficients. Campinas, SP – ISACamp 2014-2015.

<table>
<thead>
<tr>
<th>Domains and components</th>
<th>No musculoskeletal diseases (n = 2,001)</th>
<th>With musculoskeletal diseases (n = 165)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average score (standard error) (p&lt;0.05)</td>
<td>(p&lt;0.05)</td>
</tr>
<tr>
<td>Physical functioning</td>
<td>88.8 (0.7)</td>
<td>80.6 (2.1)</td>
</tr>
<tr>
<td>Physical role</td>
<td>87.8 (0.9)</td>
<td>77.1 (3.1)</td>
</tr>
<tr>
<td>Pain</td>
<td>78.3 (0.9)</td>
<td>62.1 (2.8)</td>
</tr>
<tr>
<td>General health</td>
<td>80.3 (0.8)</td>
<td>72.3 (1.8)</td>
</tr>
<tr>
<td>Vitality</td>
<td>76.9 (0.7)</td>
<td>66.4 (2.3)</td>
</tr>
<tr>
<td>Emotional role</td>
<td>89.9 (0.8)</td>
<td>81.3 (2.3)</td>
</tr>
<tr>
<td>Social functioning</td>
<td>88.5 (0.8)</td>
<td>81.9 (2.4)</td>
</tr>
<tr>
<td>Mental health</td>
<td>78.0 (0.7)</td>
<td>70.0 (2.0)</td>
</tr>
</tbody>
</table>

β = beta coefficients; * adjusted by sex and age; ** adjusted by sex, age, number of chronic diseases and education. In bold: results with p < 0.05.

Source: Authors.
Table 4. Average SF-36 scores according to the presence of musculoskeletal diseases stratified by sex, and gross and adjusted beta coefficients. Campinas, SP – ISACamp 2014-2015.

<table>
<thead>
<tr>
<th>Components</th>
<th>Average Score (standard error)</th>
<th>No musculoskeletal diseases (n = 2,001)</th>
<th>With musculoskeletal diseases (n = 165)</th>
<th>(p &lt; 0.05)</th>
<th>(p &lt; 0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (n = 165)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Physical</td>
<td>50.5 (0.3)</td>
<td>45.6 (1.0)</td>
<td>-3.8 (0.001)</td>
<td>-2.9 (0.009)</td>
<td></td>
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<tr>
<td>Mental</td>
<td>50.3 (0.4)</td>
<td>47.2 (1.0)</td>
<td>-2.6 (0.008)</td>
<td>-1.8 (0.099)</td>
<td></td>
</tr>
<tr>
<td>Male (n = 47)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical</td>
<td>51.1 (0.4)</td>
<td>44.5 (1.9)</td>
<td>-5.6 (0.005)</td>
<td>-5.4 (0.013)</td>
<td></td>
</tr>
<tr>
<td>Mental</td>
<td>51.7 (0.5)</td>
<td>51.5 (1.6)</td>
<td>-0.1 (0.953)</td>
<td>0.4 (0.838)</td>
<td></td>
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<tr>
<td>Female (n = 118)</td>
<td></td>
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<tr>
<td>Physical</td>
<td>49.9 (0.3)</td>
<td>46.1 (1.1)</td>
<td>-2.9 (0.019)</td>
<td>-1.6 (0.169)</td>
<td></td>
</tr>
<tr>
<td>Mental</td>
<td>49.0 (0.4)</td>
<td>45.1 (1.4)</td>
<td>-3.9 (0.006)</td>
<td>-3.1 (0.036)</td>
<td></td>
</tr>
<tr>
<td>No tendonitis (n = 2,059)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical</td>
<td>50.5 (0.3)</td>
<td>46.3 (1.0)</td>
<td>-2.8 (0.007)</td>
<td>-1.8 (0.067)</td>
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<tr>
<td>Mental</td>
<td>50.3 (0.4)</td>
<td>48.5 (1.2)</td>
<td>-1.4 (0.235)</td>
<td>-0.4 (0.763)</td>
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<tr>
<td>Male (n = 34)</td>
<td></td>
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<tr>
<td>Physical</td>
<td>51.1 (0.4)</td>
<td>47.1 (1.6)</td>
<td>-3.1 (0.040)</td>
<td>-2.8 (0.101)</td>
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<tr>
<td>Mental</td>
<td>51.7 (0.5)</td>
<td>52.2 (1.8)</td>
<td>0.6 (0.751)</td>
<td>1.0 (0.614)</td>
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<tr>
<td>Female (n = 85)</td>
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<tr>
<td>Physical</td>
<td>49.9 (0.3)</td>
<td>46.5 (1.3)</td>
<td>-2.6 (0.062)</td>
<td>-1.4 (0.305)</td>
<td></td>
</tr>
<tr>
<td>Mental</td>
<td>49.0 (0.4)</td>
<td>46.5 (1.6)</td>
<td>-2.5 (0.129)</td>
<td>-1.3 (0.457)</td>
<td></td>
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<tr>
<td>No WMSD (n = 2,134)</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Physical</td>
<td>50.3 (0.3)</td>
<td>43.1 (2.4)</td>
<td>-5.9 (0.023)</td>
<td>-4.7 (0.076)</td>
<td></td>
</tr>
<tr>
<td>Mental</td>
<td>50.2 (0.4)</td>
<td>44.2 (2.1)</td>
<td>-5.4 (0.010)</td>
<td>-4.9 (0.015)</td>
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<tr>
<td>Male (n = 12)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical</td>
<td>50.9 (0.4)</td>
<td>37.5 (4.8)</td>
<td>-12.3 (0.017)</td>
<td>-11.4 (0.036)</td>
<td></td>
</tr>
<tr>
<td>Mental</td>
<td>51.7 (0.5)</td>
<td>49.8 (3.4)</td>
<td>-1.9 (0.583)</td>
<td>-1.1 (0.752)</td>
<td></td>
</tr>
<tr>
<td>Female (n = 32)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical</td>
<td>49.7 (0.4)</td>
<td>45.4 (2.7)</td>
<td>-3.3 (0.240)</td>
<td>-2.0 (0.449)</td>
<td></td>
</tr>
<tr>
<td>Mental</td>
<td>48.8 (0.4)</td>
<td>41.9 (2.4)</td>
<td>-6.9 (0.005)</td>
<td>-7.1 (0.002)</td>
<td></td>
</tr>
</tbody>
</table>

β = beta coefficients; * adjusted by sex and age; * adjusted by sex, age, number of chronic diseases and education. In bold: results with p < 0.05.

Source: Authors.

the condition has become serious, chronic and with severe limitations. In this sense, our study calls for specific attention at the impact of MD on the physical dimension of the male population, especially in relation to preventing the aggravation of these problems.

Approximately 75% of the men with WMSD analyzed in the present study work on the manufacturing and construction industries. Widanarko et al.54 found that 77% of men performed heavy physical tasks, whereas 62% of women performed light physical tasks. While men tend to perform more vigorous manual labor, women are more likely to perform concentrated manual tasks (as teachers, cooks, hairdressers, or manicurists)39. In North America and Europe, for example, men are more likely to die from work-related accidents compared with women19,55. The sex division of labor can place men in jobs that pose greater physical risk56,57, being often allocated to sectors such as construction, mining, military, agriculture, among other professions that require great physical effort55,57,58.

Evidently, our research has some limitations. Cross-sectional studies usually do not allow us to identify causal factors; however, the MD diagnosis
was conducted months or years before the interviews, and the SF-36 instrument considered the previous four weeks, allowing one to deduce the data chronology – which suggests that the disorder is more likely to have an impact on HRQoL rather than the inverse. The population-based questionnaire used was designed to analyze several health issues, and not specifically for analyzing musculoskeletal disorders. Thus, it does not provide more detailed information about the types and sites of injuries involving WMSDs and tendonitis. Although the self-reported medical diagnosis was a limitation, as it may decrease result accuracy, self-reported physical morbidity data has been frequently used and considered valid in epidemiological studies. In Brazil, data on occupational illness is still limited, fragmented and heterogeneous, resulting from significant underreporting of occupational diseases and accidents. The Ministry of Social Security and Welfare provides data on formal labor market workers, which make up less than 50% of the Brazilian economically active population. Thus, studies like ours may help to gather new information.

This is the first Brazilian population-based study to evaluate HRQoL on individuals afflicted by musculoskeletal disorders, focusing on sex differences and on the impact they may have on the general population, which justifies its importance.

Our findings may contribute to policy-making in occupational health and clinical practice aimed at alerting health professionals to the prevalence, associated factors and, especially, how musculoskeletal disorders can impact the quality of life of men and women, thus enabling more effective evidence-based practices and disease prevention programs for each sex. Despite the strong body of evidence demonstrating the impact of psychosocial risks on musculoskeletal health, they are rarely included in the assessment and rehabilitation of workers. Our results reinforce the importance of psychosocial factors and how greatly they can impair quality of life, especially in the female population. With the increasing number of women in the workforce and the extension of productive life, the lack of adequate interventions may leave women vulnerable to musculoskeletal disorders in the coming years.

Conclusion

Our findings show a substantial impact of musculoskeletal diseases on the population’s HRQoL, which may reflect insufficient strategies aimed at rehabilitation, recovery, surveillance and reintegration into work, making this a necessary and urgent discussion, especially in a moment of social security reform in Brazil and proposals to extend working life.

Moreover, in addition to being more prevalent in women of still productive age, musculoskeletal diseases shows peculiarities in how they affect individuals’ well-being. For example, while MD significantly affect the mental component of women, for men the physical component shows greater impairment. In this scenario, monitoring the health and illness profile of active men and women and, especially, the impact of health problems on quality of life is essential. Studies such as this are essential to help understanding the actions, goals and plans that could extend health and quality of life for workers.

Collaborations

DBO Souza and MG Lima designed the study. Data collection and material preparation were performed by MBA Barros, MG Lima, and DBO Souza. Data analysis was performed by DBO Souza and MG Lima. The first version of the manuscript was written by DBO Souza and corrections and improvements were performed by MG Lima and MBA Barros. All authors read, performed a critical review, and approved the final manuscript.
Acknowledgements

The authors would like to thank the Collaborating Center on Health Situation Analysis team for their contributions to this research.

Funding

This study was supported by the Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP) (grant number 2012/23324-3), by the Campinas Municipal Secretary of Health and Health Surveillance Secretary of the Ministério da Saúde, by the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) (grant number: 309073/2015-4) and by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) (grant number 02-P 4585/2018).


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