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# PHYSICAL WORKLOAD AND MUSCULOSKELETAL DISORDERS AMONG CROATIAN WORKERS: A CROSS-SECTIONAL RISK EVALUATION

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*SUMMARY: Musculoskeletal disorders (MSDs) remain a leading cause of occupational morbidity in Europe, particularly among workers performing physically demanding tasks. Despite the existence of regulatory frameworks and periodic health assessments, the burden of MSDs remains high in Croatia. This study aimed to assess the health risk levels related to physical workload in Croatian workers diagnosed with MSDs, focusing on those engaged in load handling and repetitive movements. The study included 250 employed individuals (62.8% male, 37.2% female) undergoing routine occupational health evaluations, all deemed fit for work. Participants completed a detailed questionnaire on physical workload, which was used to assess risk levels using the Key Indicator Method (KIM). Diagnoses were classified per ICD-10 codes and grouped by anatomical and etiopathogenetic characteristics. The study was conducted between October 2021 and October 2022 in occupational and sports medicine clinics. Most participants were exposed to elevated or very high health risks due to physical workload. Very high risk was present in 42.5% of those involved in lifting and carrying, while 49.5% of those performing repetitive movements were at elevated risk. Gender differences were significant for repetitive movements (P = 0.030), with women experiencing greater exposure. Back disorders were the most common MSDs (80.0%), followed by overuse syndromes (12.8%) and other MSDs (7.2%). The majority (90.4%) of MSDs had been diagnosed more than a year prior, and 69.0% of these workers had taken sick leave due to symptom worsening. The study highlights significant health risks in physically demanding occupations despite mandatory medical surveillance. Gender disparities and high chronic MSD prevalence underline the need for a paradigm shift toward proactive, functionally informed occupational health strategies. These should include individualized assessments, targeted rehabilitation, and workplace interventions adapted to enterprise capacity and worker demographics.*

**Keywords:** *amusculoskeletal disorders, occupational health, physical workload, repetitive strain injury, gender differences, ergonomic risk, occupational medicine, work ability*

## INTRODUCTION

Musculoskeletal disorders (MSDs) are highly prevalent among European workers, and disease progression is often directly linked to or exacerbated by high-risk occupational exposures *(Bevan, 2015)*. These disorders are frequently accompanied by chronic work-related pain and represent a significant cause of absenteeism, diminished work ability, and long-term disability *(Punnett and We-*

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*gman, 2004)*. The most common MSDs include painful syndromes of the back, neck, and shoulders. Given that the prevalence of MSDs increases with age, the ageing of the European workforce contributes to the rising number of newly affected workers *(Govaerts et al., 2021)*. This raises critical questions regarding current and future occupational health protection – both in terms of legislation and clinical practice – and the intensity of medical surveillance for workers at the onset of MSDs or those working with chronic pain and functional limitations *(EU-OSHA, 2021)*.

In Croatia, workers who perform physically demanding tasks or repetitive movements in non-neutral, often forced body postures are entitled to undergo health assessments every two years, but only if their job has been evaluated as high or very high risk. If, despite this health surveillance, permanent health damage occurs and work capacity is reduced, the occupational health physician (OHP) is mandated to identify a health contraindication and issue a negative fitness-for-work opinion, as regulated by the Ordinance on Jobs with Special Working Conditions *(OG 5/1984)*. This Ordinance also defines medical requirements and timeframes for reassessment, along with specific contraindications for physically demanding jobs, which include deformities of the chest or pelvis and reduced function of the spine and limbs.

Aligned with Council Directive 90/269/EEC on the minimum health and safety requirements for the manual handling of loads where there is a risk particularly of back injury to workers *(Council Directive 90/269/EEC)*, and Council Directive 90/270/EEC on minimum safety and health requirements for work with display screen equipment *(Council Directive 90/270/EEC)*, the Croatian regulatory framework has evolved. In 2021, Croatia introduced the Ordinance on Occupational Safety of Workers Exposed to Static-Dynamic, Psychophysiological, and Other Workload Factors *(OG 73/2021)*, aiming to standardize risk assessment and the prescription of protective measures for physical workers. High-risk tasks were explicitly defined as those involving lifting, holding, carrying, pulling, pushing loads, and performing repetitive movements. The Ordinance also sets thresholds of physical load that necessitate either recommended or mandatory job redesign, particularly in workers over 40, under 21, or those who are inexperienced or have existing medical conditions. Protective measures, prescribed by an OHP, must be implemented by the employer *(OG 73/2021)*. These include organizational strategies such as active or passive breaks, provision of technical aids, and implementation of exercise programs targeting muscle groups most exposed to strain *(Tullar et al., 2010)*.

Eight years prior to this Ordinance, in 2013, the Croatian Society of Occupational Health published a manual of exercises for workers exposed to static and dynamic trunk loads at work *(Croatian Society of Occupational Health, 2013)*. This manual, specifically developed for OHPs, presents and illustrates stretching exercises for sedentary workers, those in forced postures, and those handling heavy loads. It also describes strengthening routines for trunk stabilizers, warm-up routines for load handlers, and functional motor tests (e.g., trunk strength, lumbar flexibility, upper limb strength, and quadriceps strength), which are valuable tools for monitoring physical capability – an aspect often neglected in routine medical surveillance *(Croatian Society of Occupational Health, 2013)*. However, research on the practical national implementation and acceptance of this manual in occupational health settings has unfortunately been lacking.

In light of the increasing regulatory demands, the aging workforce, and the persistent occurrence of musculoskeletal complaints despite preventive measures, this study aimed to assess the level of health risk in Croatian workers with musculoskeletal complaints, who regularly undergo occupational health evaluations and are engaged in physically demanding work, particularly load handling and repetitive movements.

## MATERIALS AND METHODS

### Methodology

Based on each participant's medical history and physical examination, OHPs individually established diagnoses in accordance with the Tenth Revision of the International Classification of Diseases and Related Health Problems

(ICD-10). These diagnoses referred to conditions associated with pain or reduced function of the musculoskeletal system following work activities. Once determined individually, the diagnoses were subsequently grouped according to anatomical and etiopathogenetic principles:

- Back disorders: diseases of spinal nerve roots, degenerative diseases of the cervical and lumbar spine, unspecified back pain
- Overuse syndromes: tendon and bursa diseases of the upper extremities, carpal tunnel syndrome, patellar tendinitis
- Other MSDs: seropositive rheumatoid arthritis, diseases of the shoulder, hip, knee, and peroneal nerve, as well as musculoskeletal function disorders following medical procedures or injuries.

OHPs then assessed the physical workload of the participants using a questionnaire on occupational static and dynamic workload, which included:

- Open-ended questions: regarding age, weight of load, number of repetitive hand movements, number of lifting, carrying, pulling, and pushing actions, duration of holding and performing repetitive movements, and distance covered due to carrying, pulling, and pushing loads
- Multiple-choice questions: about sex, body position when handling loads or performing repetitive hand movements, working conditions during load handling, participants' field of activity according to the National Classification of Activities 2007, time of MSD diagnosis (within/over one year before inclusion in the study), and sick leave due to worsening musculoskeletal symptoms in participants with MSDs diagnosed more than one year before study inclusion (yes/no).

Data on the number and duration of actions, as well as distances covered due to performing these actions, referred to a single workday.

Based on the responses and using the Key Indicator Method (KIM) of the German Federal Institute for Occupational Safety and Health, the physical workload of each participant was calculated within the ranges: 2.0–350.0 (lifting, carrying, holding, and transporting), 2.5–250.0 (pulling and pushing), 2.0–90.0 (performing repetitive movements). Based on individual physical workload, the individual health risk level was determined: low (< 10.0), elevated (10.0–24.0), high (25.0–49.0), very high (> 49.0) due to lifting, carrying, holding, transporting, pulling, and pushing loads; low (< 20.0), elevated (20.0–44.0), high (45.0–65.0), very high (> 65.0) due to performing repetitive movements.

The questionnaire on static and dynamic workload was developed by the authors of this study according to Annexes II and III of the Ordinance on Occupational Safety of Workers Exposed to Static-Dynamic, Psychophysiological, and Other Workload Factors, OG 73/2021 *(OG 73/2021)*. Participation in the study was voluntary and anonymous, with signed informed consent. The study was conducted from October 1, 2021, to October 1, 2022; each participant was surveyed once, and the study sites were occupational and sports medicine clinics. All of the participants were assessed as fit for work.

The study was approved by the Ethics Committee of the Zagreb University School of Medicine (reference number: 380-59-10106-21-111/199, class: 641-01/21-02/01).

**Participants**

A total of 250 fit-for-work participants (62.8% male and 37.2% female) who handled loads and/or performed repetitive movements were included. Most participants (54.8%) were employed in manufacturing, agriculture, forestry, and fishing. Data on participants' fields of activity are shown in Table 1.

**Table 1. Fields of activities[1] in participants (*N* = 250)**
**Tablica 1. Područja djelatnosti[1] sudionika (N = 250)**

| Field | *N* (%) |
|---|---|
| Manufacturing industry | 96 (38,4) |
| Agriculture, forestry, and fishing | 41 (16,4) |
| Administrative and support service activities | 24 (9,6) |
| Construction | 23 (9,2) |
| Healthcare and social welfare activities | 18 (7,2) |
| Education | 15 (6,0) |
| Information and communication | 14 (5,6) |
| Transport and storage | 11 (4,4) |
| Electricity, gas, steam, and air conditioning supply | 4 (1,6) |
| Water supply; waste water management, waste management and remediation activities | 2 (0,8) |
| Wholesale and retail trade; repair of motor vehicles and motorcycles | 2 (0,8) |

[1]according to the National Classification of Activities 2007

Participants' jobs included performing repetitive movements (N = 186, 74.4%), lifting, carrying, holding, and transporting loads by hand (N = 167, 66.8%), and pulling and pushing loads by hand (N = 123, 49.2%).

Participants' median age was 49.0 years (IQR 42.0–55.0), and no significant age difference was observed between male (48.0, IQR 42.0–55.0 years) and female (49.0, IQR 43.0–56.0 years) participants, U = 6896.0, z = -0.732, P = 0.464.

### Statistical Analysis

Categorical and continuous variables were described using appropriate descriptive statistics.

The Kolmogorov-Smirnov test indicated an asymmetric age distribution (P < 0.001). Differences in health risk levels due to performing repetitive movements between male and female participants were analysed using the Fisher-Freeman-Halton exact test. Differences in age between male and female participants, as well as between participants with and without sick leave, were analysed using the Mann-Whitney U test.

P values less than 0.05 were considered statistically significant. The collected data were processed using IBM SPSS Statistics for Windows, version 25.0 (IBM Corp., Armonk, NY, USA).

## RESULTS

The health risk level among participants was mostly: very high (lifting, moving, holding, and carrying) and elevated (pulling, pushing, and performing repetitive movements). More details on health risk levels due to physical workload are shown in Table 2.

**Table 2. Health risk levels[1] among participants who lifted, moved, held, and carried loads (*N* = 167), pulled and pushed loads (N = 123), and performed repetitive movements (N = 186)**

**Tablica 2. Razine zdravstvenog rizika[1] kod sudionika koji su podizali, premještali, držali i nosili terete (N = 167), vukli i gurali terete (N = 123) te izvodili ponavljajuće pokrete (N = 186)**

| | Lifting, moving, holding, carrying | Pulling and pushing | Repetitive movements |
|---|---|---|---|
| **Low** | 13.2% | 13.8% | 21.5% |
| **Elevated** | 26.3% | 34.1% | 49.5% |
| **High** | 18.0% | 26.0% | 28.0% |
| **Very high** | 42.5% | 26.0% | 1.1% |

[1]*low* (<10.0), elevated (10.0–24.0), *high* (25.0–49.0), *very high* (>49.0) for lifting, moving, holding, carrying, pulling, and pushing loads; *low* (<20.0), elevated (20.0–44.0), *high* (45.0–65.0), *very high* (>65.0) for performing repetitive movements

The difference in health risk levels due to performing repetitive movements between male and female participants was significant (P = 0.030), while for lifting, moving, holding, and carrying (P = 0.822), and pulling and pushing (P = 0.547), the differences were not significant. More details on health risk levels in men and women are shown in Table 3.

**Table 3. Differences in health risk levels[1] due to lifting, moving, holding, and carrying loads between male (*N* = 123) and female (*N* = 44) participants, pulling and pushing loads between male (*N* = 93) and female (*N* = 30) participants, and performing repetitive movements between male (*N* = 110) and female (*N* = 76) participants**

**Tablica 3. Razlike u razinama zdravstvenog rizika[1] zbog podizanja, premještanja, držanja i nošenja tereta između muških (N = 123) i ženskih (N = 44) sudionika, vučenja i guranja tereta između muških (N = 93) i ženskih (N = 30) sudionika te izvođenja ponavljajućih pokreta između muških (N = 110) i ženskih (N = 76) sudionika**

| | | Men | Women | *P* |
|---|---|---|---|---|
| **Lifting, moving, holding, carrying** | Low | 12.2% | 15.9% | 0.822 |
| | Elevated | 27.6% | 22.7% | |
| | High | 17.1% | 20.5% | |
| | Very high | 43.1% | 40.9% | |
| **Pulling and pushing** | Low | 11.8% | 20.0% | 0.547 |
| | Elevated | 36.6% | 26.7% | |
| | High | 26.9% | 23.3% | |
| | Very high | 24.7% | 30.0% | |
| **Performing repetitive movements** | Low | 28.2% | 11.8% | 0.030[2] |
| | Elevated | 47.3% | 52.6% | |
| | High | 23.6% | 34.2% | |
| | Very high | 0.9% | 1.4% | |

[1] *low* (<10.0), elevated (10.0–24.0), *high* (25.0–49.0), *very high* (>49.0) for lifting, moving, holding, carrying, pulling, and pushing loads; *low* (<20.0), elevated (20.0–44.0), *high* (45.0–65.0), *very high* (>65.0) for performing repetitive movements

[2] significant at significance level $P < 0.05$

MSDs among participants were: back disorders (80.0%), overuse syndromes (12.8%), and other MSDs (7.2%). The difference in prevalence between male and female participants was significant, P = 0.048. More details on MSDs and diagnoses associated with pain or reduced musculoskeletal function after work are presented in Table 4.

**Table 4. Musculoskeletal disorders and diagnoses associated with pain or reduced musculoskeletal function after work in male (*N* = 157), female (*N* = 93), and all (*N* = 250) participants**

**Tablica 4. Mišićno-koštana oboljenja i dijagnoze povezane s boli ili smanjenom mišićno-koštanom funkcijom nakon rada kod muških (N = 157), ženskih (N = 93) i svih (N = 250) sudionika**

| | Diagnosis code[1] | Men | Women | Σ |
|---|---|---|---|---|
| **Back disorders** | M43.1, M50, M50.1, M50.2, M50.9, M51, M51.0, M51.1, M51.9, M53, M53.0, M53.1, M54, M54.1, M54.3, M54.4, M54.5, M54.6, M54.9 | 82.2% | 76.3% | 80.0% |
| **Overuse syndromes** | M65.3, M65.4, M68.8, M70.1, M70.3, M71, M75.1, M75.3, M75.4, M75.5, M76.5, M77, M77.1, G56.0 | 10.2% | 17.2% | 12.8% |
| **Other[2]** | M05, M16, M23, M23.2, M23.5, M75, M96.9, S46.7, S68.2, G57.3 | 7.6% | 6.5% | 7.2% |

[1] according to the Tenth Revision of the International Classification of Diseases and Related Health Problems (ICD-10)

[2] seropositive rheumatoid arthritis, diseases of the shoulder, hip, knee, and peroneal nerve, and MSDs following medical procedures or injuries

In most participants (90.4%), the MSD was diagnosed more than one year before inclusion in the study, with the majority (69.0%) being on sick leave due to worsening musculoskeletal symptoms within one year before inclusion. In 9.6% of participants, the disorder was diagnosed within one year before inclusion.

Participants with MSDs diagnosed more than one year before inclusion (median age 49.0, IQR 42.8–56.0 years) were significantly older than those diagnosed within one year before inclusion (median age 45.5, IQR 40.5–50.0 years), $U = 2014.0$, $z = -2.074$, $P = 0.038$. Participants on sick leave due to worsening symptoms within one year before inclusion (median age 50.0, IQR 43.0–56.0 years) were significantly older than those without sick leave (median age 46.0, IQR 39.8–55.0 years), $U = 4400.5$, $z = -2.333$, $P = 0.020$.

## DISCUSSION

Musculoskeletal disorders (MSDs) remain a dominant cause of occupational morbidity across Europe and globally, posing a significant economic burden on both individuals and health systems *(Bevan, 2015)*. In Croatia, despite the presence of a robust legal framework and periodic medical assessments for high-risk workers, this study demonstrates a high level of physical workload-related health risk among those involved in load handling and repetitive manual tasks. Notably, 42.5% of participants involved in lifting, moving, carrying, and holding were exposed to a very high level of physical workload, while nearly half (49.5%) of those performing repetitive movements were classified at an elevated risk. These data confirm prior evidence that musculoskeletal strain persists despite regulatory measures and raise concerns about the implementation efficacy of current preventive programs *(Punnett and Wegman, 2004, Govaerts et al., 2021)*.

Furthermore, gender-based analysis revealed that women are significantly more likely to experience higher risk levels from repetitive work ($P = 0.030$), reflecting findings about gender-specific vulnerability to biomechanical strain. The observed gender disparity in repetitive strain exposure is consistent with literature showing that women are disproportionately affected by overuse syndromes – such as tendinopathies, bursitis, and carpal tunnel syndrome – particularly in precision-based manual occupations *(Punnett and Herbert, 2000, Hooftman et al., 2009)*. Several mechanisms contribute to the observed gender disparity in musculoskeletal disorder prevalence and severity. First, women often perform identical tasks using a greater proportion of their maximal voluntary force compared to men, resulting in earlier onset of fatigue and increased susceptibility to cumulative trauma hand disorders *(Hooftman et al., 2009)*. Additionally, hormonal influences – particularly oestrogen fluctuations – can lead to increased joint laxity and heightened pain sensitivity, both of which may exacerbate micro trauma accumulation and the development of chronic pain syndromes *(Fillingim et al., 2009)*. A third contributing factor is anthropometric mismatch: many work tools, machines, and workstation layouts are designed according to male body dimensions, creating biomechanical inefficiencies and suboptimal working postures for female workers, thereby increasing ergonomic risk exposure *(Kilbom, 1994, Gustafsson et al., 2017)*.

These findings necessitate gender-sensitive ergonomic strategies, including: adjustable and modular workstation designs, redesigned hand tools tailored to diverse hand sizes, customized work-rest cycles, targeted interventions in sectors with a predominantly female workforce (e.g., textile, healthcare, food processing). Recognizing and addressing gender-specific vulnerabilities is a key component of inclusive occupational health practice and regulatory compliance. However, findings regarding women's susceptibility to repetitive movements are still inconclusive; rather, they vary and do not indicate specific anthropometric characteristics associated with accelerated development of musculoskeletal disorders *(Roquelaure, 2018)*.

The finding that 9.6% of workers were diagnosed with MSDs during routine periodic evaluations underscores the limitations of current occupational surveillance in preventing disease onset. These cases likely represent an early or prodromal stage of musculoskeletal pathology, where symptoms may be intermittent and structural changes potentially reversible. This presents a critical win-

dow for intervention. Instead of a binary approach to fitness-for-work assessments, a structured clinical-functional evaluation protocol should be introduced for newly diagnosed individuals. This should include objective tools such as the Back Performance Scale for spinal mobility *(Strand et al., 2002)*, QuickDASH for upper limb function *(Beaton et al., 2005)*, and the Functional Movement Screen for identifying movement pattern deficiencies *(Cook et al., 2006)*. Follow-up should be individualized and include at least two re-assessments over a 12-month period, complemented by consultation with physical and rehabilitation medicine specialists. Diagnostic support – such as surface electromyography, musculoskeletal ultrasound, and isokinetic strength testing – can help identify functional deficits and guide therapy *(da Silva et al., 2017, Shariat et al., 2018)*. Intervention should include kinesiotherapy, proprioceptive training, and progressive resistance exercises, which have demonstrated efficacy in workplace MSD prevention *(Waters et al., 1993)*. A comprehensive risk stratification model should be based on: clinical findings (e.g., neurological signs, discopathy), workload quantification via the Key Indicator Method (KIM), symptom burden measured by validated scales such as the Oswestry Disability Index *(Fairbank and Pynsent, 2000)* and Visual Analog Scale.

Workers meeting high-risk criteria across these domains should be prioritized for workplace task modification, intensive therapy, and ergonomic reassessment. This approach positions occupational medicine as a proactive clinical discipline aimed at maintaining long-term work ability rather than merely certifying fitness status.

Among the 90.4% of participants with previously diagnosed MSDs – primarily chronic lumbar spine conditions – the focus shifts from early detection to secondary prevention and functional maintenance. International standards from EU-OSHA and NIOSH emphasize that manual handling of loads exceeding 15 kg, frequent trunk flexion beyond 60°, and sustained static postures are unacceptable without engineering or administrative controls *(Punnett and Wegman, 2004, Govaerts et al., 2021, Silverstein et al., 2002, Bernard, 1997)*. Larger enterprises often have the capacity to implement best practices such as: use of mechanical lifting aids, ergonomically optimized workstations, and job rotation schemes. However, micro- and small-sized enterprises frequently lack financial and technical resources for comprehensive intervention, exacerbating health inequities *(Bao et al., 2006)*. A tiered implementation model is thus necessary. At the baseline level, mandatory interventions should include scheduled micro breaks, task redistribution, and ergonomic awareness training. Recommended enhancements may comprise tool redesign, adjustable workstations, and access to physiotherapy and telehealth consultations. For enterprises with greater capacity, optional advanced controls such as AI-driven workload monitoring and wearable ergonomic sensors can be considered.

With an aging workforce and chronic musculoskeletal conditions already established in over 90% of participants, the need to shift from passive certification of work capacity toward active risk management and health preservation becomes imperative. National policy should support this model with funding incentives, training programs, and cross-sector occupational safety audits to ensure harmonized protection across industries and enterprise sizes.

## CONCLUSION

This study reveals substantial occupational health challenges related to physical workload in Croatian workers engaged in manual and repetitive labour. Despite the existence of a comprehensive regulatory framework and mandatory periodic health evaluations, musculoskeletal disorders remain highly prevalent and insufficiently mitigated, affecting both newly diagnosed and chronically exposed workers. Risk levels were particularly high in sectors such as manufacturing and agriculture, and significant gender-related disparities in exposure and vulnerability were evident.

To improve outcomes, a paradigm shift is required – from reactive fitness-for-work certification toward proactive, clinically oriented, and functionally informed occupational health management. This includes individualized surveillance protocols, targeted rehabilitation, and stratified workplace interventions that reflect the

specific needs of different industries and worker demographics. Gender-sensitive ergonomic adjustments and differentiated implementation models, particularly in micro- and small-sized enterprises, must be prioritized to ensure equitable protection.

Importantly, this study opens several new lines of inquiry. Future research should investigate the long-term effectiveness of individualized rehabilitation protocols in preserving work ability among high-risk occupational groups, as well as the clinical utility and cost-efficiency of integrating functional diagnostic tools into routine occupational health assessments. Additional research is needed to identify practical and economic barriers to the implementation of ergonomic interventions in smaller enterprises, and to evaluate the impact of gender-responsive workplace design on the prevention of overuse syndromes and reduction of work-related absenteeism. Furthermore, studies assessing the predictive value of functional screening instruments, such as the QuickDASH and Back Performance Scale, for early detection of work disability risk, would be of particular benefit.

Strengthening the evidence base in these areas will enhance the effectiveness of occupational health strategies and support the development of sustainable, inclusive, and health-promoting working environments across all sectors.

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## *TJELESNO OPTEREĆENJE I MIŠIĆNO-KOŠTANA OBOLJENJA HRVATSKIH RADNIKA: EVALUACIJA RIZIKA*

*SAŽETAK: Mišićno-koštana oboljenja (MSDs) vodeći su uzrok profesionalnih poboljenja u Europi, posebno među radnicima koji obavljaju tjelesno zahtjevne poslove. Unatoč postojećim regulatornim okvirima i periodičnim procjenama zdravlja, u Hrvatskoj je broj tih oboljenja i dalje velik. Ovo istraživanje imalo je za cilj procijeniti razinu zdravstvenih rizika vezanih za tjelesno opterećenje kod hrvatskih radnika s dijagnozom MSDs, s fokusom na osobe čiji je posao rukovanje teretima i one izložene ponavljajućim kretnjama. Istraživanje je provedeno na 250 zaposlenih (62,8 % muškaraca, 37,2 % žena) podvrgnutih rutinskim zdravstvenim procjenama na radu, a svi su smatrani sposobnima za rad. Sudionici su ispunili detaljan upitnik vezano za tjelesno opterećenje, koji je poslužio za procjenu razine rizika pomoću Key Indicator Method (KIM). Dijagnoze su razvrstane po ICD-10 kodovima i grupirane prema anatomskim i etiopatogenskim osobinama. Istraživanje je trajalo od listopada 2021. do listopada 2022. i obavljalo se u klinikama medicine rada i sportske medicine. Većina je sudionika bila izložena povišenim ili vrlo visokim rizicima za zdravlje pripisanim tjelesnom opterećenju. Vrlo visok rizik ustanovljen je kod 42,5 % osoba koje podižu i prenose terete, dok je kod 49,5 % izloženih ponavljajućim kretnjama bilo s povišenim rizikom. Spolne razlike bile su značajne kod ponavljajućih kretnji (P=0.030), a ustanovljeno je da su žene više izložene. Oboljenja kralježnice bila su najčešća (80,0 %), a slijedilo je pretjerano opterećenje (12,8 %) i druga oboljenja (7,2 %). Većina (90,4 %) oboljenja dijagnosticirano je prije više od godine dana, a 69,0 % tih zaposlenika prethodno je već bilo na bolovanju radi pogoršanja simptoma. Istraživanje baca svjetlo na značajne zdravstvene rizike kod tjelesno zahtjevnih zanimanja unatoč obveznom medicinskom nadzoru. Spolne razlike i visoka učestalost oboljenja ističu potrebu za promjenom paradigme prema proaktivnim, funkcionalno informiranim radnim strategijama. Ove bi strategije trebale uključiti individualne procjene, ciljanu rehabilitaciju te intervencije na radnom mjestu prilagođene kapacitetu tvrtke i radnoj snazi.*

***Ključne riječi:*** *mišićno-koštana oboljenja, zdravlje na radu, tjelesno opterećenje, ozljede od ponavljajućih napora, razlike po spolu, ergonomski rizik, medicina rada, radna sposobnost*

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