ABSTRACT

Keywords: health-related absenteeism, musculoskeletal disorders, low back pain, healthcare employees, workplace health promotion

Introduction: Health-related absenteeism impacts individuals, companies, and society. Its consequences are reflected in the cost of benefits, substitutes, and reduced productivity. Research shows that musculoskeletal disorders (MSDs) are the most common work-related health problem reported by hospital staff. This study determines the groups at the Ljubljana University Medical Centre that are most susceptible to MSDs, especially low back pain.

Methods: Using data from the Health Data Centre of the Slovenian National Public Health Institute and the medical centre, this cross-sectional study analysed absenteeism among medical centre employees. The correlation between MSD / low-back pain risk factors and incidence was determined using logistic regression. An odds ratio was calculated to determine the probability of MSDs, most especially low back pain via sex, age, occupation, and education.

Results: Sick leave at the medical centre is higher than 5%, exceeding the Slovenian healthcare sector average. MSDs, as the main reason for absence, is significantly more frequent in women, non-medical staff, and employees with a maximum secondary school education. Among the MSDs, low back pain predominates as a reason for absence and is most frequent among nurses, midwives, and employees of 20 to 44.9 years old.

Conclusion: This study offers insight into the health status of medical centre employees. The high percentage of sick leave is mainly due to musculoskeletal disorders, including low back pain. This is an important basis for further monitoring and analysis of sick leave indicators and for planning systematic and continuous workplace health-promoting measures to manage ergonomic risk factors and reduce health-related absenteeism.

IZVLEČEK

Klijučne besede: zdravstveni absentizem, bolečine v križu, promocija zdravja pri delu

Uvod: Zdravstveni absentizem ima pomemben vpliv na posameznika, podjetje in družbo. Posledice tega se lahko na ravi podjetja kažejo v prehrani, na vrednostih, zdravljenju, uživanju pri delu in v zmarljenih zdravstvenih izdatkih. Najvišji delež zdravstvenega absentizma je posledica bolezni mišično-kostnega sistema in teka v notranji igri. Te bolezni so najpogostejše pri zdravnih delavcih. V dostopimih raziskavah se posebej izstupa bolečina v križu pri delavcih v zdravnem in zdravstvenem sistem. Med zdravstvenimi delavci se bolečine v križu najpogosteje pojavljajo po 40. letu. Zdravstveno zdravljenje v zdravstveni ustanovi je pomembno zato, ker je bolečina v križu najpogostejše raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejše raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejše raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejše raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejše raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejše raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejše raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejše raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejše raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejše raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejše raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejše raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejše raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejše raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejše raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejše raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejše raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejše raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi, da je bolečina v križu najpogostejse raziskovno vredno zato, ker se lahko zdi
1 INTRODUCTION

Health-related absenteeism is a socioeconomic phenomenon that has an important effect on individuals, companies, and society in general. Factors influencing health-related absenteeism are diverse and are not linked exclusively to employee health status; they can be economic, psychological, social, and cultural (1, 2). At the individual level, the following negative effects of absence due to illness are mentioned most frequently: low personal income, limited opportunities for promotion and career development, and limited opportunities for changing jobs; in addition, absence due to illness significantly reduces work motivation and indirectly increases the chances of becoming unemployed (2-4). At the company level, the consequences of health-related absenteeism primarily show in the costs of treatment benefits and staff substitution, and in reduced productivity, which in turn can have a negative impact on the economy in general (2).

Work-related diseases are reported by 40 to 60% of the working-age population in the majority of EU countries (5). As a rule, absence due to illness is more frequent and longer among women, older employees, those exposed to more strenuous physical work, and those with low socioeconomic status (5, 6). According to an Irish study, the causes of long-term absence primarily include injuries, poor mental health, and back pain (7). In EU countries, musculoskeletal diseases (MSDs) have the highest prevalence among work-related diseases (8). A diagnosed MSD often leads to early retirement and is the prevailing risk factor for occupational disability, especially among women (9).

MSDs are also the main reason for health-related absenteeism among Slovenian employees (2, 10). In 2015, absence among the employees due to MSDs in Slovenia accounted for 2,320,498 calendar days lost. A single absence due to MSDs lasted 29 days on average and 2.82 calendar days were lost per employee due to this disease group (10).

The majority of studies exploring health-related absenteeism among health professionals focus on nurses, who usually represent the largest group of employees (11-14). Research findings also show that MSDs are the most frequent work-related health problem among hospital staff, especially nurses (11-14). In addition, MSDs and especially low back pain result in substantial financial costs, in which half of the costs related to absence from work and disability due to MSD can be ascribed to low back pain (13, 16, 17).

Based on the currently available literature, studies of MSDs and especially low back pain in healthcare occupational groups other than nurses and midwives are extremely rare (18-20). Moreover, data on the risk of low back pain by age group are not consistent (13, 17). The aim of this study is to analyse in detail the health status of staff at the healthcare institute observed using sick-leave data in order to provide a basis for developing and implementing workplace health-promotion programs and monitoring their results. This study also examines the occupational groups at the healthcare institute observed that are most susceptible to MSDs and especially low back pain, and the age group that is at the greatest risk in this regard.

2 METHODS

This cross-sectional study analysed health-related absenteeism among Ljubljana University Medical Centre employees from January 1st to December 31st, 2014 and from January 1st to December 31st, 2015.

Anonymised and aggregated data on employee numbers and structure (sex, age, education, and occupation) were obtained from the Ljubljana University Medical Centre personnel records. Data for analysing health-related absenteeism for both years were obtained from the Health Data Portal of the Slovenian National Public Health Institute (hereinafter: the NPHI). The data on absenteeism were processed and presented using a social-medical method, which typically uses calendar days and closed cases per diagnosis during a period observed in order to calculate and present sick leave indices, such as the percentage of sick leave (% SL), the frequency index (FI), and severity (S). Differences in the frequency of MSDs, especially low back pain, as the most frequent diagnosis, between various employee groups, were established using a chi-squared test. The correlation between MSD / low-back pain risk factors and incidence was determined using logistic regression. An odds ratio (OR) was calculated to determine the probability of MSD and low back pain occurrence in employees by sex, age, occupation, and education. A statistically significant difference was defined at p<0.05. IBM SPSS Statistics 20.0.0 software was used for data processing.

1The percentage of sick leave (% SL) refers to the percentage of calendar days lost per employee in 1 year. The frequency index (FI) refers to the number of sick leave cases per 100 employees, irrespective of the duration of individual sick leave. Severity (S) refers to the average number of calendar days lost per sick leave and reveals the average duration of a sick leave expressed in days.
3 RESULTS

3.1 Analysis of Employee Health at the Ljubljana University Medical Centre

On December 31st, 2014 and December 31st, 2015, the Ljubljana University Medical Centre had 7,778 and 7,884 employees respectively, or 6,168 (79.3%) / 6,246 (79.2%) women and 1,610 (20.7%) / 1,638 (20.8%) men (21, 22; Table 1).

Table 1. Occupational, age, and educational structure of Ljubljana University Medical Centre employees in 2014 and 2015.

|                        | 2014     | 2015     |
|------------------------|----------|----------|
| **Occupational structure** |          |          |
| Physicians and dentists | 1,177 (15%) | 1,212 (15%) |
| Nurses and midwives     | 3,791 (49%) | 3,857 (49%) |
| Other health professionals | 883 (11%)   | 884 (11%)  |
| Non-health professionals | 1,901 (24%) | 1,910 (24%) |
| Other employees from other pay grades | 26 (< 1%) | 21 (< 1%) |
| **Age structure**       |          |          |
| <44.9 years             | 4,866 (63%) | 4,896 (62%) |
| >45 years               | 2,912 (37%) | 2,988 (38%) |
| **Educational structure** |          |          |
| Up to and including secondary school degree | 4,040 (52%) | 3,974 (50%) |
| College or university degree | 2,905 (37%) | 3,055 (39%) |
| Specialisation, master’s degree, PhD | 833 (11%) | 855 (11%) |

The analysis of sick-leave indices at the Ljubljana University Medical Centre shows that in both 2014 and 2015, the percentage of sick leave was higher than 5% (2014: 5.52%; 2015: 6.10%) and exceeded that of the Slovenian healthcare sector in general (2014: 5.30%; 2015: 5.77%). The frequency index shows that every employee out of 100 was absent due to illness 1.4 times in 2014 and 1.8 times in 2015. The severity index, which shows the average duration of sick leave, was 1.6 days less compared to 2014 (Table 2).

Table 2. Comparison of sick-leave indices (% SL, FI, and S) at the Ljubljana University Medical Centre for 2014 and 2015.

|       | % SL | FI     | S     |
|-------|------|--------|-------|
| 2014  | 5.52 | 146.70 | 13.70 |
| 2015  | 6.10 | 184.43 | 12.07 |

MSDs (%SL<sub>2014</sub>=1.01%; %SL<sub>2015</sub>=1.04%) are the main reason for the higher percentage of sick leave. Taking care of a family member is the most frequent reason for taking sick leave (FI<sub>2014</sub>=42.00; FI<sub>2015</sub>=52.49), and injuries and poisoning at work are the main reasons for the longest absence from work (S<sub>2014</sub>=65.47, S<sub>2015</sub>=68.57).

The percentage of sick leave differs by sex. MSDs account for the highest percentage of sick leave in women, whereas in men, the main reasons are non-work-related injuries and poisoning (Table 3).
There were significant differences in the frequency of MSD incidence between men and women in 2014 ($\chi^2=40.55$, $p<0.0001$) and 2015 ($\chi^2=49.81$, $p<0.0001$). MSDs occurred more frequently in women than in men in both 2014 (OR=1.93; 95% CI=1.57–2.37, $p<0.0001$) and 2015 (OR=1.98; 95% CI=1.63–2.40, $p<0.0001$).

MSDs occurred more frequently in employees above 45 years of age. A comparison of the frequency of occurrence of various MSD diagnoses at the Ljubljana University Medical Centre shows that, compared to other diagnoses, low back pain (dorsalgia, diagnosis code M54) was the most common and occurred in half of all cases reported (51% in 2014 and 55% in 2015). The odds of developing low back pain among employees ranging between 20 to 44.9 years old were twice as high among employees ranging from 45 to 65 years old (Table 4).

Another interesting finding is that, compared to all other occupational groups, nurses and midwives did not show a higher risk of developing MSDs in 2014 (OR=1.06; 95% CI=0.92–1.22, $p=0.38$) and 2015 (OR=2.28; 95% CI=1.99–2.62, $p<0.0001$) than health professionals. However, the results show that health professionals had higher odds of developing low back pain than non-health professionals in 2015 (OR=1.35; 95% CI=1.05–1.73, $p=0.02$; Table 5).

A comparison by an occupational group shows that non-health professionals$^2$ had higher odds of developing MSDs in 2014 (OR=1.89; 95% CI=1.63–2.20, $p=0.0001$) and 2015 (OR=2.28; 95% CI=1.99–2.62, $p<0.0001$) than health professionals. However, the results show that health professionals had higher odds of developing low back pain than non-health professionals in 2015 (OR=1.35; 95% CI=1.05–1.73, $p=0.02$; Table 5).

Another interesting finding is that, compared to all other occupational groups, nurses and midwives did not show a higher risk of developing MSDs in 2014 (OR=1.06; 95% CI=0.92–1.22, $p=0.38$). The same was also true in 2015 (OR=0.97; 95% CI=0.85–1.11, $p=0.66$), which cannot be said for low back pain: in 2015, the odds of nurses and midwives developing low back pain were nearly 1.5 times higher than that of other occupational groups (OR=1.41; 95% CI=1.10–1.80, $p<0.006$).

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Table 3. Percentage of sick leave (%SL) at the Ljubljana University Medical Centre by first five diagnoses in 2014 and 2015.

| Condition | % SL | 2014 | 2015 | 2014 | 2015 |
|-----------|------|------|------|------|------|
| MSDs      |      | 1.15 | 1.18 | 0.35 | 0.43 |
| Pregnancy, birth, and postnatal period | 0.67 | 0.75 |      |      |
| Taking care of a family member | 0.67 | 0.72 |      |      |
| Respiratory diseases | 0.57 | 0.72 | 0.37 | 0.45 |
| Non-work-related injuries and poisoning |      |      | 0.48 | 0.43 |

*% SL = percentage of sick leave*  

Table 4. Odds ratio for MSDs and low back pain by age group at the Ljubljana Medical Centre, 2014-2015.

| Age group | Period | OR   | (95% CI) | $\chi^2$ | $p$     |
|-----------|--------|------|----------|----------|---------|
| MSD       | 45-65 years vs. 2014 | 2.46 | 2.13-2.83 | 163.21 | <0.0001 |
|           | 20-44.9 years 2015  | 2.66 | 2.32-3.01 | 216.83 | <0.0001 |
| Low back pain | 20-44.9 years 2014 | 1.83 | 1.40-2.39 | 19.77 | <0.0001 |
|           | 45-65 years 2015     | 2.05 | 1.52-2.65 | 30.68 | <0.0001 |

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$^2$ Non-health professionals (mostly in public employee pay grade J) account for 25% of all employees at this healthcare institution and consist of various occupations: cooks, cleaning and maintenance staff, janitors, heating plant workers, electricians, plumbers, laundry staff, (administrative) secretaries, bookkeepers, accountants, IT specialists, materials managers, warehouse staff, and so on.
Social status certainly also affects the development of MSDs. Social status established based on educational level shows that in 2014, employees with a maximum secondary-school education had 2.4 times higher odds of developing MSDs compared to higher-educated employees (OR=2.41; 95% CI=2.07–2.80, p<0.0001). The same results were also obtained in 2015 (OR=2.49; 95% CI=2.16–2.86, p<0.0001).

Compared to higher-educated employees, those with a maximum secondary-school education were not at greater risk of developing low back pain.

4 DISCUSSION

The predominant diagnoses causing absence from work among employees at the Ljubljana University Medical Centre primarily include MSDs, which are also the main reason for health-related absenteeism among all employees in Slovenia (2, 10), in Europe (8, 16, 23), and globally (24).

Among MSDs, low back pain is the most frequent (13, 16, 17, 25-27). The occurrence of MSDs and especially low back pain has been well researched for health professionals, especially nurses (13, 17, 23, 28). Based on the available literature, exceptionally little research has been done on MSDs and especially low back pain among other health professions (18, 19, 20). Some older studies conducted at hospitals reported a high prevalence of MSDs and especially low back pain among non-health professionals, especially administrative and technical staff, who ascribed it to largely sedentary work and lifting or carrying heavy items, repeated movement, and static muscular activity (6, 23).

The findings of this study show that, compared to higher-educated employees, those with a maximum secondary-school education, who presumably have a low socioeconomic status, have higher odds of developing MSDs. Similar findings have also been established by other studies (5, 6). Namely, socioeconomic status (SES) has long been considered an exacerbating risk factor for developing MSDs that should not be ignored. In addition, SES also influences employees’ capacity to deal with their health problems; employees with a lower level of education show a lower capacity in this regard (27).

This study also shows that health professionals and especially nurses and midwives have the highest odds of developing low back pain. The majority ascribe this to physical strain at work, such as providing care to moving and transporting patients, and lifting heavy loads (13, 15, 23). A Slovenian survey on health-related absenteeism also established that female health and social care employees are the most susceptible to low back pain (27).

In contrast to a 2016 survey conducted at Slovenian hospitals, which showed that it is primarily elderly employees that suffer from low back pain (17), this study reveals a higher risk of developing low back pain among younger employees: the odds of developing low back pain were twice as high among employees of 20 to 44.9 years old than among those of 45 to 64.9 years old. Similar findings were also obtained by Demšar et al. (13). Studies conducted on the general population also report the highest incidence of low back pain in the third decade of life (29). These results can at least be partly ascribed to the healthy worker effect (HWE) - a phenomenon in which employees experiencing low back pain already change jobs or retire as disabled when they are young, and so less absenteeism of this type may be observed at an older stage in life.
One of the weaknesses of this study may be the fact that it was carried out on the health staff of only one healthcare institution in Slovenia. However, it should be noted that this is an extremely large organisation with nearly 8,000 employees and therefore, it is highly likely that the findings obtained can be generalised to all health professionals employed at Slovenian hospitals. In addition, the impersonal approach, whereby the estimates were made based on anonymised and aggregated data, did not allow more complex analyses and additional inquiries about the possible causes of MSDs and especially low back pain.

A clear advantage of this study is that it includes non-health professionals employed at a hospital, who are clearly at risk in this regard. Namely, the majority of published research on MSDs in hospital staff largely describes health professionals, whereas non-health professionals have remained overlooked. Therefore, in the future, it would make sense not only to monitor sick leave indices for all employees at the healthcare institution but also to conduct an analytical study that would also reveal as many important risk factors as possible for developing MSDs and especially low back pain among non-health professionals.

5 CONCLUSION

MSDs are the main reason for the high percentage of sick leave among Ljubljana University Medical Centre employees. They pose the greatest risk for non-health professionals, who make up an extremely heterogeneous and often overlooked group. The highest odds of developing low back pain were established for health professionals, especially nurses and midwives. The introduction of ergonomic measures in the workplace can prevent or alleviate many of these diseases. The authors of this study expect their findings to help health organisations plan systematic and ongoing workplace health promotion measures to manage the ergonomic risk factors. These measures should include setting up an ergonomic work environment (checking whether the workplace has ergonomic furniture, replacing non-ergonomic furniture with ergonomic furniture, and offering guided active breaks) and providing employee training, especially to vulnerable groups with a lower education level and a low SES, in order to reduce health-related absenteeism and improve employee wellbeing.

CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

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ETHICS COMMITTEE APPROVAL

The data analysed in this study were obtained from the national database maintained by the National Institute of Public Health and the database maintained by the Ljubljana University Medical Centre. The data were analysed without information about the identity of individuals. The study was conducted in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki). All of the analyses were performed on aggregated data and did not include personal information.

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