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Musculoskeletal disorders caused by the work of nurses at the primary level of health care

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ABSTRACT

Introduction: Work-related musculoskeletal disorders (WRMSDs) are the most common work-related illnesses and describe a wide range of degenerative and inflammatory conditions affecting peripheral nerves, blood vessels, bones, joints, muscles, tendons, and ligaments. WRMSDs are one of the most common causes of absenteeism among nurses. Studies also indicate that as many as 87.8% of nurses in Europe have reported WRMSDs.

Methods: The study involved 94 nurses and technicians of both genders who were involved in the daily provision of health services to patients. The study was conducted at the Public Institution of the Sarajevo Canton Health Center, the largest primary health care institution in Bosnia and Herzegovina, which, in addition to primary care, also provides specialist and consultative services. The study was designed as a cross-sectional descriptive-analytical study that included all respondents who met the inclusion criteria. The instruments used in the study were the standardized Dutch musculoskeletal discomfort questionnaire, modified for our research, and the standardized work ability index (WAI) questionnaire.

Results: The highest frequency of WRMSDs in nurses was in the neck area (79.8%), followed by the upper back (71.3%), and, in third place, the lower back (64.9%). The average value of the WAI in the sample was 34.83 ± 8.35 , with a median of 36.5.

Conclusion: The results of our study indicate that the average value of the WAI in the examined sample was in the "good" category. Although the work ability of most respondents was assessed as satisfactory, there is also a group of respondents with moderate and poor work ability, which indicates a risk of further impairment of work functionality. The findings point to the need to include the examined group in a structured ergonomic intervention program aimed at preserving and improving work ability and preventing its further decline.

Keywords: Work-related musculoskeletal disorders; nurses; primary health care

INTRODUCTION

Work-related musculoskeletal disorders (WRMSDs) are the most common work-related diseases and encompass a wide range of degenerative and inflammatory conditions affecting peripheral nerves, blood vessels, bones, joints, muscles, tendons, and ligaments (1,2). WRMSDs are among the most common occupational health problems in the medical profession and significantly affect the work ability, quality of life, and professional performance of healthcare workers (3). Musculoskeletal disorders are also one of the leading causes of absenteeism among nurses (4). Studies show that the prevalence of WRMSDs in nurses ranges between 60% and 98% (5,6). This high prevalence is due to long-term and frequent exposure to risk factors for

the development of musculoskeletal disorders. These factors include: prolonged standing or sitting in the same position; improper bending, twisting, and lifting; repetitive work movements; frequent work in static and unnatural body positions; lack of ergonomic aids; field work; shift work; psychological stress and work overload.

Studies also indicate that as many as 87.8% of nurses in Europe have reported WRMSDs. A meta-analysis of European studies shows that the most commonly affected areas are the neck, upper and lower back, and shoulders, with prevalences ranging from 40% to 60%. There is consensus that the lower back is the most affected area, with a prevalence of around 60%, while the elbows are the least affected, with a prevalence of 18% (7).

METHODS

The study involved 94 nurses and technicians of both genders who were engaged in the daily provision of health services to patients. It was conducted at the Public Institution

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of the Sarajevo Canton Health Center, the largest primary health care institution in Bosnia and Herzegovina, which, in addition to primary care, also provides specialist and consultative services.

The sample included respondents over 18 years of age with at least 1 year of work experience who were directly involved in working with patients. In addition, the criteria included respondents who spent at least 50% of their working time working with patients, as well as those who gave written consent to participate in the study.

The study was designed as a cross-sectional descriptive-analytical study that included all respondents who met the inclusion criteria. The instruments used were the standardized Dutch musculoskeletal discomfort questionnaire, modified according to our research, and the standardized work ability index (WAI) questionnaire.

The authors obtained the necessary approval for conducting the research from the Center for Educational and Scientific Research Activities and the Ethics Committee of the Public Institution Health Center of Sarajevo.

The data are presented in tables and charts by total number of cases, percentage, mean, standard deviation, and range, depending on the type of data. Deviation from the expected distribution was tested using the Chi-square test (χ^2), and the results were considered significant at a 95% confidence level or with p values below 0.05.

The analysis was performed using the IBM Statistical Package for Social Sciences, version 23.0 (Chicago, Illinois, USA).

All data generated and/or analyzed during this study are presented in this article and are available from the corresponding author.

RESULTS

Analysis of the respondents' gender revealed that there were significantly more female respondents in the sample, 84 (89.4%), compared to 10 (10.6%) male respondents. Statistical analysis using the chi-square test showed a statistically significant deviation of the gender structure of the respondents from the expected distribution ($\chi^2 = 34.468$; $p = 0.0001$).

The mean age of respondents in the sample was 46.47 ± 10.88 years, with a median of 49 years. The youngest respondent was 20 years old, while the oldest respondent was 64 years old.

Analysis of years of employment and working hours showed that respondents had been in their current job for an average of 19.91 ± 11.81 years, with the shortest employment period being 1 year and the longest 40 years. The average weekly working hours of respondents were 38.38 ± 2.39 h. The shortest reported weekly working hours were 35 h, while the longest were 50 h/week.

The results of our research show that the most prevalent risk factors for the occurrence of WRMSDs in our respondents are work overload (85.1%), psychological stress (83.0%), shift work (78.7%), and frequent repetition of work movements (71.7%). There are also factors with slightly lower percentages, such as prolonged standing (51.6%), prolonged sitting (59.6%), and frequent work in the same position (56.7%) (Figure 1).

Analysis of the presence of pain/discomfort in the neck, upper back, and lower back areas revealed that the most affected area was the neck (79.8%), followed by the upper back (71.3%), while the lower back was the least affected (64.9%). Statistical analysis using the Chi-square test indicated that there is no significant difference in the prevalence of pain across these locations ($\chi^2 = 5.205$; $p = 0.074$) (Table 1).

Analysis of the presence of pain/discomfort in the upper extremities revealed that the most frequently affected area is the shoulder (48.9%), followed by the wrists (40.4%), and, in third place, the elbows (23.4%). Statistical analysis using the Chi-square test indicated a statistically significant difference in the prevalence of pain across individual locations in the upper extremities, with a greater prevalence of pain in the shoulders and wrists/hands compared to the elbows ($\chi^2 = 13.544$; $p = 0.001$) (Table 2).

Analysis of the presence of pain/discomfort in the lower extremities revealed that the most frequently affected area is the knee (48.9%), followed by the hips (29.8%), and, in third place, the ankle joints (28.7%). Statistical analysis indicates a significant difference in the presence of pain across individual locations in the lower extremities, with a greater presence of pain in the knees compared to the hips or ankles/feet ($\chi^2 = 10.582$; $p = 0.005$) (Table 3).

The majority of respondents had a WAI score in the range of 37–43, which corresponds to the “good” category. This is followed by respondents with a WAI score in the range of 28–36 (“moderate”), then respondents with a score of 7–27 (“poor”), while the smallest number of respondents had a WAI score in the range of 44–49 (“excellent”) (Table 4).

The average value of the WAI in the sample was 34.83 ± 8.35 , with a median of 36.5, which, according to the rules of rounding, is classified as “good.” The lowest recorded index is 8, and the highest is 49. The majority of respondents (39.4%) achieved results in the “good” category, while 27.7% were in the “moderate” category, 22.3% in the “poor” category, and 10.6% in the “excellent” category (Table 5).

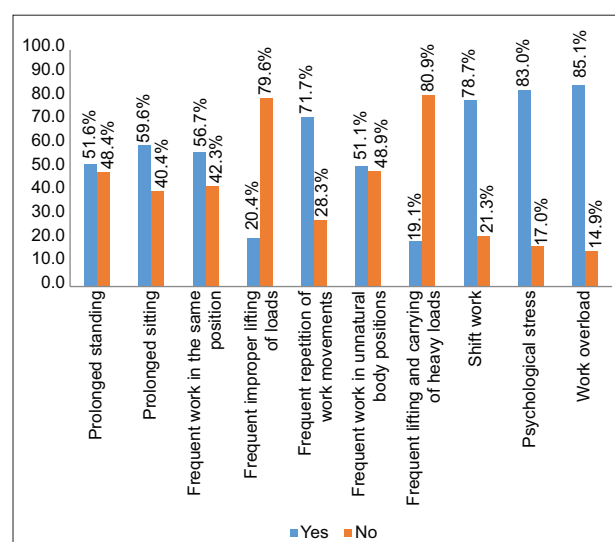


FIGURE 1. Presence of risk factors for work-related musculoskeletal disorders

DISCUSSION

WRMSDs represent a significant occupational and health problem among nurses in primary care. Their incidence is closely linked to long-term and frequent exposure to risk factors for musculoskeletal disorders.

A study conducted by Sisala Mohammed et al. in Ghana showed that the most common risk factors for the development of WRMSDs are working in the same position for a long period of time – such as prolonged sitting and standing, frequent bending, and kneeling – in 68.0% of cases; working with a large number of patients in 54.8% of cases; and working in a bent position in 54.1% of cases (8). Our study, however, highlights work overload, psychological stress, and frequent repetition of work tasks among the most common risk factors. Risk factors such as frequent work in the same position and prolonged sitting and standing are similarly represented in both our study and the study by Sisala Mohammed et al.

In our study, the most commonly affected anatomical region was the neck, followed by the upper back, while the lower back was the third most frequently reported area. This finding is somewhat different from most available studies, which report the lumbar region as the most commonly affected area in nurses. Analyzing the results of their study,

TABLE 1. Presence of pain/discomfort in the neck upper and lower back region

Region	Yes (%)	No (%)	Significance
Neck	75 (79.8)	19 (20.2)	$\chi^2=5.205$; $p=0.074$
Upper back	67 (71.3)	27 (28.7)	
Lower back	61 (64.9)	33 (35.1)	

TABLE 2. Presence of pain/discomfort in the upper limbs region

Region	Yes (%)	No (%)	Significance
Shoulders	46 (48.9)	48 (51.1)	$\chi^2=13.544$; $p=0.001$
Elbows	22 (23.4)	72 (76.6)	
Wrist/hand	38 (40.4)	56 (59.6)	

TABLE 3. Presence of pain/discomfort in the lower limbs region

Region	Yes (%)	No (%)	Significance
Hip/thigh	28 (29.8)	66 (70.2)	$\chi^2=10.582$; $p=0.005$
Knee	46 (48.9)	48 (51.1)	
Ankle/foot	27 (28.7)	67 (74.3)	

TABLE 4. WAI categories

WAI categories	Percentage	Significance
Poor (7-27)	21 (22.3)	$\chi^2=8.795$; $p=0.032$
Moderate (28-36)	26 (27.7)	
Good (37-43)	37 (39.4)	
Excellent (44-49)	10 (10.6)	

WAI: Work ability index

TABLE 5. The average value of the WAI

WAI	Mean	Standard deviation	Standard error of the mean	Minimum	Maximum	Significance
	34.83	8.35	0.86	8.00	49.00	$t=40.438$; $p=0.0001$

WAI: Work ability index

Sun et al. found that the most commonly affected area in nurses was the lower back (59.5%), followed by the neck (53.0%), and, in third place, the shoulder area (46.8%) (3).

The increased incidence of neck and upper back pain in our study may be explained by the specific characteristics of work in primary health care. In this context, work often involves prolonged sitting, computer use, administrative tasks, and static body positions, which increase the load on the cervical and thoracic regions. A study conducted by Ribeiro et al. in 2017 in Portugal found that in nurses, the most commonly affected area was the lower back (63.1%), followed by the neck (50.1%), and, in third place, the upper back (40.9%) (9).

Regarding the upper extremities, in our research, the most frequently affected areas were the shoulders, then the wrists, and the elbows. The results of the study conducted by Parthiban et al. correlate with the results of our research, with the most frequently affected area in their study also being the shoulders (23.6%), followed by the elbows (17.3%) and the wrists (4.5%) (10). These findings are consistent with previous research indicating that shoulders are among the most commonly affected regions in nurses, particularly due to repetitive motion, static loading, and a combination of administrative and clinical tasks.

In the lower extremities, in our study, the most commonly affected areas were the knees, followed by the hips, and, in third place, the ankles. A cross-sectional study conducted by Nemera et al. in Ethiopia found that in the lower extremities, nurses most often reported pain in the knees (20.3%), hips (14.9%), and ankles (11.6%) (11). These complaints may be associated with prolonged standing and movement during the workday, which is characteristic of primary, secondary, and tertiary levels of health care.

Our results suggest that the pattern of pain distribution in primary care nurses may differ from the traditionally described pattern in secondary and tertiary care settings, where the lumbar region dominates. This difference may indicate a shift in the dominant load factors from dynamic and biomechanical loads to static and postural loads, highlighting the need for ergonomic interventions tailored to the specific characteristics of primary care.

In a study conducted by Peralta et al. in Argentina within primary health care, the authors examined the index of work ability. They found that the largest number of respondents, 50% of them, had a WAI score in the range of 37-43, which corresponds to the category “good.” This was followed by subjects with a WAI score in the range of 44-49 (“excellent”) in 38% of cases, then subjects with a score of 28-36 (“moderate”) in 12% of cases, while no subject had a WAI score in the range of 7-27 (“poor”) (12).

The results of the study conducted in Argentina correlate with our results, as the authors from Argentina determined

that the largest number of respondents had a WAI score corresponding to the category “good,” which is in accordance with the findings of our study. After that, respondents with a WAI score corresponding to the “excellent” category follow in frequency, while in our research, the “good” category is followed by the “moderate” category. Furthermore, in the Argentine study, the “moderate” category occupies the next level by frequency, while in our sample, it is followed by the “poor” category. Finally, in the study conducted in Argentina, no subject had a WAI score in the “poor” category, while in our study, 10.6% of subjects had a WAI score corresponding to the “poor” category. According to the study conducted by Garosi et al. in Iran, the average WAI score was 40.01 ± 4.05 , which corresponds to the “good” category and indicates the need to improve work ability in the examined group (13).

A study conducted by Heyam et al. in Jordan in 2018 showed that the average WAI score was 29.3 ± 6.8 , which corresponds to the “moderate” category and also indicates the need to improve work ability in the studied population (14).

The results of these studies in Iran and Jordan are consistent with the results obtained in ours, where the average WAI scores from Iran and our research fall into the same category, while the results from Jordan are one category lower.

CONCLUSION

The highest incidence of WRMSDs among nurses and technicians was recorded in the neck area, followed by the upper and lower back. In the upper extremities, the highest incidence of disorders was found in the shoulder, while in the lower extremities, the highest incidence was recorded in the knee.

The results of our study indicate that the average WAI value in the examined sample fell into the “good” category. Although the work ability of most respondents was assessed as satisfactory, a portion of respondents had moderate or poor work ability, which indicates a risk of further impairment of work functionality. These findings point to the need to include the examined group in a structured ergonomic intervention program aimed at preserving and improving work ability and preventing further decline.

Based on a review of the available literature, it can be observed that most research on WRMSDs in nurses is focused on the hospital setting, that is, secondary and tertiary levels, with relatively few studies explicitly addressing musculoskeletal disorders in nurses in the primary health care setting. Hospitals, especially surgical and intensive care units, are characterized by more pronounced physical strain (patient transfer, lifting, prolonged standing), which makes them a more frequent subject of ergonomic research. In addition, work in primary health care encompasses a variety of activities, including administrative tasks, education, and community outreach, which is why this population is less often considered a separate research group. Such work is often perceived as less physically demanding than work in a hospital setting. However, such a perception can be misleading. Prolonged sitting, computer work, repetitive movements, field driving, and the combination of administrative and clinical tasks that characterize work in primary

health care also greatly contribute to the development of musculoskeletal disorders.

In primary health care, the job descriptions of nurses and technicians encompass a wide range of activities, including outpatient work, community outreach, preventive programs, and administrative tasks. This diversity makes it difficult to standardize the measurement of physical activity and to compare results across studies, which may be one reason for the limited number of specific studies in this area.

By contrast, in the hospital setting, sick leave and work-related injuries related to activities such as lifting and moving patients are more frequent, which contributes to greater interest from researchers and decision-makers in this population.

In primary health care, symptoms often manifest as chronic complaints that are not recorded as occupational injuries and therefore remain less researched.

The limited number of studies specifically related to WRMSD in primary care nurses does not mean that the problem does not exist, but rather indicates the need for additional research that would examine in more detail the specific risks and burden factors in this segment of the health care system.

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DECLARATION OF INTERESTS

Authors declare no conflict of interest.

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