

# The potential association of musculoskeletal pain with presenteeism and work engagement among intensive care unit nurses: a cross-sectional study

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## ABSTRACT

**Aim:** Work-related musculoskeletal disorders and associated musculoskeletal pain among intensive care nurses are important, as these factors may be related to presenteeism and work engagement. The aim of this study was to investigate the potential association of musculoskeletal pain with presenteeism and work engagement among intensive care nurses.

**Material and Method:** This descriptive study was carried out with members of the Turkish Society of Critical Care Nurses. All the participants completed a questionnaire, which included questions about general demographic data and occupational musculoskeletal exposures (Occupational Safety and Health Administration [OSHA] Ergonomic Assessment Checklist). To measure pain, work engagement and presenteeism, the following instruments were used: The Brief Pain Inventory Short Form (BPI SF), Utrecht Work Engagement Scale (UWES-17) and Stanford Presenteeism Scale-6 (SPS-6). This study was performed in 2021, and the questionnaire was distributed via email to the database of Turkish Society of Critical Care Nurses.

**Results:** Our study was completed with 153 intensive care unit nurses. Among the study population, 76.5% (n=117) of the nurses had chronic musculoskeletal pain, 80% of whom had exposure to lifting heavy weights. There was a weak negative correlation between pain and work engagement, as shown by the BPI SF pain interference subscale and the vigour subscale of the UWES-17 (p=0.04, r=-.166). There was also a weak negative correlation between pain and presenteeism according to the BPI SF pain interference subscale and SPS-6 (p=0.04, r=-.193). There was no statistically significant association between workplace ergonomic exposures, presenteeism, work engagement and the presence of chronic musculoskeletal pain.

**Conclusion:** Neither chronic musculoskeletal system pain nor pain intensity was significantly correlated with work engagement, occupational musculoskeletal exposures or presenteeism. However, musculoskeletal pain-related effects on daily activities of living had a negative impact on work engagement (vigour) and presenteeism.

**Keywords:** Presenteeism, intensive care nurses, musculoskeletal pain, work engagement, workplace exposure

## INTRODUCTION

Work-related musculoskeletal disorders are one of the most important health problems among healthcare workers, with such disorders reported to be a major cause of sickness absence among nurses (1). According to previous studies, approximately 50% of nurses have complained of work-related back pain (2,3). In a Turkish study on healthcare workers, the prevalence of musculoskeletal disorders was 77.1% (4). Previous research reported that pain is the most common musculoskeletal symptom among nurses (5).

Intensive care units pose a high risk of musculoskeletal disorders in nurses. According to a study in China,

almost all nurses in intensive care units reported work-related musculoskeletal problems, and approximately 30% of intensive care unit nurses requested a transfer to another unit or time off because of musculoskeletal problems (6).

Presenteeism is defined as a condition whereby employees perform activities in the workplace in a non-productive way and without putting in a good performance due to medical conditions and/or work-related problems (7). Workplace exposures and various health-related issues, including stress, allergies, upper respiratory tract infections and musculoskeletal pain,

can cause presenteeism in nurses (8). In 2002, Koopman et al. (9) developed the Stanford Presenteeism Scale-6 (SPS-6), which evaluates the concept of presenteeism in the context of active commitment to work in the presence of health problems.

Work engagement is defined as a positive, fulfilling, affective-motivational state of work-related well-being (10). Work engagement is associated with satisfaction with the work being done (11). Work engagement can be measured using the Utrecht Work Engagement Scale (UWES). This scale has three important dimensions: willingness to work, work engagement and concentration on work. The 'willingness to work dimension' refers to the level of energy, enthusiasm and commitment to work. The 'work engagement dimension' relates to how individuals see their work (i.e. as having meaning and purpose). A high level of work engagement means employees are enthusiastic about their work and perceive it as inspiring. They are also proud of their work and evaluate it positively. The concentration on work dimension refers to the level of concentration of employees at work (12). They are not aware of time passing, thinking only of what they must do and being happy doing it (12).

Thus far, only one study has investigated the relationship between musculoskeletal pain and work engagement (13). This study found no relationship between the presence of musculoskeletal pain and work engagement in a crude analysis. However, in a subsequent analysis, the authors concluded that work engagement decreased in the presence of musculoskeletal pain when age, education time, body mass index (BMI), working hours and economic satisfaction values were taken into account (13). To our knowledge, no studies have investigated the relationship between musculoskeletal pain and work engagement among nurses. Therefore, the aim of our study was to evaluate the potential association of musculoskeletal pain with presenteeism and work engagement in intensive care unit nurses. The secondary aims of this study were to evaluate whether there was a relationship between occupational ergonomic exposures and musculoskeletal problems in the study population.

## MATERIAL AND METHOD

The study were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki and in line with the Strengthening the Reporting of Observational Studies in Epidemiology statement (14). The study was carried out with the permission of Necmettin Erbakan University Meram Faculty of Medicine Non-Pharmaceutical and Medical Device Research Ethics Committee (Date: 17.04.2020, Decision No: 2020/2420).

## Study Design and Setting

The study was performed between Mar 2020 and August 2020 in Konya Research and Training Hospital. This was a nationwide, cross-sectional study on the association of musculoskeletal pain with work engagement and presenteeism in nurses working in intensive care units. We also evaluated the relationship between ergonomic exposures and the presence of chronic musculoskeletal pain.

## Participants

The study population comprised nurses aged 18–55 years who had worked for at least 1 year in intensive care units in Turkey. In order to avoid gender discrimination, no data on gender were collected. Pregnant nurses, in addition to nurses with a BMI over 35, chronic inflammatory diseases, cancer or a history of spine stabilization surgery, joint arthroplasty and acute or chronic osteomyelitis, were excluded from the study. A pilot study was performed with 10 nurses who worked in Konya Training and Research Hospital surgery clinics.

After corrections based on the pilot study, the questionnaire was disseminated via email to members of the Turkish Society of Critical Care Nurses using the Google Forms® survey system. The database of the society hosts the email addresses of approximately 500 nurses. The questionnaire was also distributed to intensive care unit nurses in our hospital who fulfilled the inclusion criteria. Completion of the questionnaire was voluntary, and anonymity was guaranteed, with no names for personal data required.

## Variables and Outcomes

Demographic and work/occupational characteristics (total time in the job, working duration in the intensive care unit, monthly working hours and shift type) of the study group were collected. In addition, all the participants completed the Brief Pain Inventory Short Form (BPI SF), a revised version of the Occupational Safety and Health Administration (OSHA) Ergonomic Assessment Checklist, the UWES-17 and the SPS-6. The presence of chronic pain was determined using a Google Form® survey designed specifically for the study.

The BPI SF is an easy-to-understand short pain assessment that a participant can complete alone. The BPI SF consists of two subscales evaluating pain intensity and pain-related effects. On the form, individuals are asked to evaluate their current pain, as well as the least and most severe pain in the last 24 hours and their average pain level. A numerical rating scale (0–10) is used to rate the severity of pain on the BPI SF, where 0 denotes 'no pain' and 10 denotes 'the most severe

pain ever experienced'. To evaluate the effect of pain on work-related parameters and daily activities of living, mood, sleep quality, mobility and social relationships were evaluated using a 0–10 numerical scale, where 0 indicated 'not affected at all' and 10 denoted 'totally affected' (15).

Pain is usually regarded as chronic when the pain recurs or lasts for more than 3–6 months (16). In our study, in assessing the presence of chronic musculoskeletal system pain, we used a cut-off value of 3 months as a reference. Those with chronic pain noted the site of pain on the first section of the BPI SF.

For the assessment of musculoskeletal exposures, we used a revised version of the OSHA Ergonomic Assessment Checklist Form, adapted for use with intensive care nurses (17). The checklist consisted of the following questions: Do you frequently lift 10 kg and/or occasionally 25 kg or more? Do you work 1–3 hours a day in jobs that require extreme reach points? Do you sit or work 1–3 hours in a standing position at workstations with an abnormal height (extremely low or extremely high)? Do you often move patients (care, lift, transfer from bed to bed, turning over in bed)? Do you often push patient stretchers or wheelchairs? Do you work at least 1–3 hours a day in jobs that require abnormal neck, waist/hip, elbow, wrist or shoulder postures and that place excessive force on these joints? The participants were asked to respond to these questions by writing yes or no.

Work engagement was assessed using the previously validated Turkish version of the UWES-17, (18). This is a self-report scale, which is scored using a 5-point Likert rating scale: 1 (strongly disagree) to 5 (strongly agree). Using this scale, vigour is assessed using 6 items, and dedication and absorption are assessed using 5 and 6 items, respectively (19).

Presenteeism was evaluated using the Turkish version of the SPS-6, validated by Coskun (20). The SPS-6 evaluates cognitive, behavioural and emotional status during working hours. The SPS-6 is scored between 6 and 30, with low scores denoting low job performance and high scores indicating good job performance (9).

### Statistical Analysis

Statistical analyses were performed using SPSS version 20 (IBM Corp., Armonk, NY). There were no missing data on the variables in the study. The Shapiro–Wilk test was used to evaluate the distribution of the data. Descriptive data are presented as the median, with the interquartile range (IQR) for non-normally distributed numerical variables and as the frequency (n) and

percentage (%) for categorical variables. A chi-square test was used to compare nominal variables between independent groups. Spearman's correlation analysis was used to evaluate the correlation between numerical and ordered categorical variables. The Mann–Whitney U test was employed to compare linear variables between independent groups. A value of  $p < 0.05$  was considered statistically significant.

## RESULTS

In total, 175 questionnaires were collected from the database survey and the intensive care nurses in our hospital. After excluding invalid questionnaires and questionnaires from respondents who did not fulfil the inclusion criteria, there were 153 questionnaires included in the study. **Table 1** shows the demographics of the nurses included in the study.

Variables	Median	IQR (25-75%)
Age (years)	31	28-40
Body mass index (kg/m <sup>2</sup> )	24.16	20.90-27.32
Total years in nursing profession	9	6-15
Years in the ICU	6	3-10
Monthly working hours	176	168-176

IQR= Interquartile Range; ICU= Intensive Care Unit

The results showed that 57.5% (n=88) were married, and 85% (n=130) had no chronic illnesses. The average working duration in the nursing profession was 9 years, and the average working duration in intensive care was 6 years. In the study population, 66.7% (n=102) of the nurses worked a shift system (night shift), and their monthly working hours were 176 hours on average. Chronic musculoskeletal pain was present in 76.5% (n=117) of the nurses, with the site of pain in the axial area (29%), extremities (16%) and axial area and extremities (61%).

According to the occupational musculoskeletal exposure assessment using the OSHA Ergonomic Assessment Checklist, the exposures were: lifting heavy weights (n=94, 61.4%), excessive reaching (n=66, 43.1%), transferring patients (n=103, 67.3%) and pushing patient stretchers or wheelchairs (n=59, 38.6%). The nurses were involved in jobs that required abnormal postures that placed excessive strain on their necks (52.9%, n=81), waists/hips (66%, n=101), elbows (44.4%, n=68), wrists (54.2%, n=83) and shoulders (56.2%, n=86). The results obtained from the scales related to musculoskeletal system pain (BPI SF), work engagement (UWES-17) and presenteeism (SPS-6) are given in **Table 2**.

**Table 2.** The Results of UWES, SPS-6 and BPI-SF scales

Scales	Median	IQR (25-75%)
BPI SF severity	3.25	0.5-4.5
BPI SF interference	2.57	0.21-4.57
SPS-6	19	18-23
UWES Vigor	3.17	2.20-4.40
UWES dedication	3.80	2.60-4.40
UWES absorption	3.17	2.33-3.83
UWES total	3.23	2.41-3.88

IQR= Interquartile Range; BPI SF= Brief Pain Inventory Short Form; BPI SF severity: Brief Pain Inventory Short Form pain severity subscale score; BPI SF interference: Brief Pain Inventory-Short Form pain interference subscale score; UWES: Utrecht Work Engagement Scale; SPS-6: Stanford Presenteeism Scale-6.

In the occupational musculoskeletal exposure evaluation using the OSHA Ergonomic Assessment Checklist, there was no statistically significant association between musculoskeletal exposure and the presence of chronic musculoskeletal pain. There was also no statistically significant difference between nurses with and without chronic musculoskeletal pain in terms of age, BMI, total years in the nursing profession, working years in intensive care units, monthly working hours and having a non-musculoskeletal chronic illness ( $p=0.33, 0.71, 0.92, 0.45, 0.64$  and  $0.29$ , respectively).

There was no statistically significant difference between nurses with and without chronic musculoskeletal pain in terms of work engagement and presenteeism when analysed using the UWES-17 subscales (vigour, dedication, absorption and total scores) and SPS-6 ( $p=0.33, 0.91, 0.81, 0.85$  and  $0.89$ , respectively).

There was no correlation between musculoskeletal pain severity and work engagement according to the total scores on the UWES-17 for vigour, dedication and absorption ( $p=0.09, 0.71$  and  $0.79$ , respectively). There was no correlation between musculoskeletal pain interference and dedication scores, absorption scores and total scores on the UWES-17 ( $p=0.32, 0.81$  and  $0.82$ , respectively), but a weak negative correlation was found between the BPI SF pain interference subscale and vigour subscale of the UWES-17 ( $p=0.04, r=-.166$ ). In addition, no correlation was found between the BPI SF pain severity subscale and the SPS-6 ( $p=0.114, r=-.150$ ), but a weak negative correlation was found between the pain interference subscale (BPI SF) and the SPS-6 ( $p=0.04, r=-.193$ ).

## DISCUSSION

Intensive care nursing requires both physical and mental dedication, as well as a high level of skill and effort. The relationship between occupational musculoskeletal exposures and musculoskeletal system pain and presenteeism and decreased work engagement among intensive care nurses has not been extensively studied. In this study, chronic musculoskeletal pain

was present in 76.5% of the intensive care nurses. There was no difference in presenteeism, work engagement, occupational musculoskeletal exposure, working life and demographic data between the group with chronic musculoskeletal pain and those without.

In a study by Ceder et al. (13) on 702 nurses, 86% and 77% of nurses reported musculoskeletal pain and chronic musculoskeletal pain, respectively, in the last year, and age and BMI were higher in those with musculoskeletal pain. Ceder et al. (13) showed that musculoskeletal pain alone was not associated with work engagement. However, after adjustment for age, education years, BMI, working hours and financial satisfaction the difference between the groups was statistically significant. The insufficient number of cases in our study means we were unable to establish a direct causal relationship between pain and work engagement.

In our study, we evaluated the severity of chronic musculoskeletal pain and the impacts of pain on activities of daily living using the BPI SF. We found that musculoskeletal pain-related impacts on life determined using the BPI SF had a negative impact on vigour in work engagement, as assessed by the UWES-17. In a longitudinal study on 8,837 workers, Leijten et al. (21) evaluated physical health using SF-12 and work engagement using the UWES. They reported that higher work engagement was associated with better physical health. Ceder et al. (13) also reported that work engagement was negatively affected by the impacts of moderate and severe pain impact measured using the Örebro Musculoskeletal Pain Questionnaire. In our study, only pain interference was correlated with vigour. This may be explained by a potential bias effect of the item 'emotional state' on work engagement, which was not evaluated in our study.

In our study, we evaluated work engagement using the UWES-17. The vigour score (3.17) was low, and dedication (3.80), absorption (3.17) and work engagement total scores (3.23) were average. Similar to our study, Mason et al. (22) assessed work engagement among surgical intensive care unit trauma nurses using a 9-item UWES. They reported a score of 3.8, which is considered low.

The overall SPS-6 score in our study group was 19.0, which is considered moderate presenteeism. There was no correlation between musculoskeletal pain intensity and presenteeism in our study. In contrast, Bae et al. (23) showed that work-related musculoskeletal pain and presenteeism were related in their study on physiotherapists.

In our study, there was no correlation between occupational musculoskeletal exposure and the

presence of chronic musculoskeletal pain. However, in their study on 8,837 nurses, Leijten et al. (21) found that higher physical occupational exposure was associated with poorer physical health. Ando et al. (24) evaluated occupational musculoskeletal exposures and injuries in 314 nurses and found no association between neck, shoulder or arm pain and low back pain in the last month and occupational exposures in a Cox regression model. In a multi-centre study on nursing technicians and auxiliaries that employed the Nordic Musculoskeletal Questionnaire, Fonseca et al. (25) demonstrated that musculoskeletal disorders affecting the lower back, neck, shoulders and upper back were related to lifting, improper back postures and repetitive gestures. In a cohort study, Burdorf and Jansen (26) showed that work-related physical load was associated with the occurrence of low back pain and pain-related disability. The inconsistency of the findings of our study with those in the literature may be related to the subjective assessment of occupational musculoskeletal exposures in the current study. It may be possible to obtain more accurate results with researcher-based and detailed repetitive measurements of occupational exposure assessments.

### Limitations

There are a few limitations in the present study. First, the low number of participants limits the generalizability of our results. Second, the voluntarily enrolment in the study may have caused selection bias, as those who volunteered to take part in the study may have been more likely than those who did not volunteer to suffer from musculoskeletal pain. Another limitation is the lack of any psychosocial evaluation. Work engagement is related to both work- and personal-related attributes, and psychosocial status may affect the relation between musculoskeletal pain and work engagement. This study did not include the effect of COVID-19 pandemic, because at the time of the questionnaire only the nurses at dedicated hospitals were dealing with COVID-19 patients, who were not included in this study.

### CONCLUSION

Chronic musculoskeletal pain is common among intensive care nurses. In this study, work engagement and presenteeism were moderate. Chronic musculoskeletal system pain and pain intensity were not correlated with work engagement and presenteeism. Musculoskeletal pain-related impacts on daily activities of living have a negative effect on presenteeism and vigour in work engagement. We found no correlation between occupational musculoskeletal exposures and the presence of chronic musculoskeletal pain.

### ETHICAL DECLARATIONS

**Ethics Committee Approval:** The study was carried out with the permission of Necmettin Erbakan University Meram Faculty of Medicine Non-Pharmaceutical and Medical Device Research Ethics Committee (Date: 17.04.2020, Decision No: 2020/2420).

**Informed Consent:** All patients signed the free and informed consent form.

**Referee Evaluation Process:** Externally peer-reviewed.

**Conflict of Interest Statement:** The authors have no conflicts of interest to declare.

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