Association Between Psychosocial Factors and Low Back Pain Among Nurses Working in Intensive Care Units

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ABSTRACT

Objective: Low back pain is among the most common occupational health problems in nurses. It is known that occupational exposure and psychosocial factors are important risk factors. The purpose of this study is to assess the prevalence of low back pain among nurses employed in intensive care units and to examine the relationship between psychosocial factors and the occurrence of low back pain. **Materials and Methods:** This cross-sectional study was conducted with 127 nurses employed in intensive care units. Data were gathered on participants' socio-demographic characteristics, presence of low back pain symptoms, and psychosocial factors, and were analyzed using SPSS 15.0. **Results:** The one-month prevalence of low back pain among these nurses was found to be 70.9%. Low back pain was high in female participants [OR:6.56 (95% CI:1.98-21.73)] and those who worked the night shift [OR:6.62 (95% CI:1.68-26.09)] and the presence of the social support in the workplace [OR:0.97 (95% CI:0.95-0.99)] has a protective effect against low back pain. **Conclusion:** Among nurses working in intensive care units, females and those assigned to night shifts experienced more intense low back pain, while those with social support reported less frequent discomfort.

Keywords: Low Back Pain, Psychosocial Factors, Social Support, Effort-Reward Imbalance, Job Strain.

Yoğun Bakım Ünitelerinde Çalışan Hemşirelerde Psikososyal Faktörler ve Bel Ağrısı Arasındaki İlişki

ÖZ

Amaç: Bel ağrısı, hemşirelerde en sık görülen mesleki sağlık sorunları arasındadır. Mesleki maruziyetin ve psikososyal faktörlerin önemli risk faktörleri olduğu bilinmektedir. Bu çalışmanın amacı, yoğun bakım ünitelerinde çalışan hemşirelerde bel ağrısının sıklığını ve psikososyal faktörler ile bel ağrısı arasındaki ilişkiyi belirlemektir. **Gereç ve Yöntem:** Bu araştırma, yoğun bakım ünitelerinde çalışan 127 hemşire ile yürütülen kesitsel bir çalışmadır. Katılımcıların sosyo-demografik özellikleri, bel ağrısı semptomlarının varlığı ve psikososyal faktörler hakkındaki veriler toplanmış ve SPSS 15.0 ile analiz edilmiştir. **Bulgular:** Son bir ay içinde hemşirelerde bel ağrısı sıklığı %70,9 idi. Kadın katılımcıların bel ağrısı erkeklere [OR:6.56 (%95 GA:1.98-21.73)] ve gece vardiyasında çalışanlara [OR:6.62 (%95 GA:1.68-26.09)] göre yüksek bulunmuştur. Buna karşın iş yerinde sosyal desteğin varlığı [OR:0.97 (%95 GA:0.95-0.99)] bel ağrısına karşı koruyucu bir etkiye sahiptir. **Sonuç:** Yoğun bakım ünitelerinde çalışan kadın hemşireler ve gece vardiyasında çalışanlar daha fazla bel ağrısı yaşarken, sosyal desteği yüksek olanlarda bel ağrısı sıklığı daha düşüktür.

Anahtar Kelimeler: Bel Ağrısı, Psikososyal Faktörler, Sosyal Destek, Çaba-Ödül Dengesizliği, İş Stresi.

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INTRODUCTION

Low back pain (LBP) stands out as the most frequently reported musculoskeletal issue among workers. In research on disease burden, Murrey et al., LBP which ranked 11th in the global disability-adjusted life-years in 1990 took the 6th place in 2010. In developed countries, the problem is in the first three (Murray et al., 2012). In the article by Ferrari et al. (2024) on global burden of disease study, it was reported that low back pain dropped from 12th place to 9th place from 1990 to 2021. When the data from the same study is examined, it is seen that it always ranks first in terms of Years Lived with Disability without any change.

LBP complaints are among the most common problems in health and social services workers (Cherry et al., 2001). Studies have reported a wide range of LBP prevalence among nurses, with figures varying between 33.0% and 86.0% (Lorusso et al., 2007). Cargnin and colleagues study involving nurses, LBP was reported by 51.4% of participants over the past year, while 45.4% experienced it within the last week (Cargnin et al., 2019). A review study conducted on Italian nurses reported LBP incidence ranging from 13.7% to 20.0% annually, with prevalence between 17% and 63.7% (Brusini, 2021). An in-depth meta-analysis of research focused on ICU nurses reported that the annual prevalence of low back pain (LBP) ranged from 34.5% to 100.0%. The pooled analysis in this study indicated a 12-month prevalence of 76.0% (95% CI, 69.0%-81.8%) (Sang et al., 2021). Another meta-analysis reported that 65.0% of healthcare workers experienced LBP annually (Al Amer, 2020). A similar rate was found in a meta-analysis study conducted in nurses working in the African region [Prevalence Rate: 64.1% (95% CI: 58.7-69.5)] (Kasa et al., 2020).

In the development of the LBP in working people, not only demographic characteristics (gender, age, etc.) but also occupational factors are effective (Al Amer, 2020; Coury et al., 2002; Latina et al., 2020; Özcan et al., 2007; Strazdins & Bammer, 2004; Vinstrup et al., 2020). A review study identified several significant factors associated with the development of LBP in nurses, including night shifts, inadequate training, frequent patient handling, lack of proper equipment, work department, obesity, age, work-related stress, and a lack of physical activity (Brusini, 2021). LBP complaints are more common especially in female health professionals than in males (Al Amer, 2020; Sun et al., 2021) and the frequency of complaints increase with age (Abolfotouh et al., 2015; Al Amer, 2020; Latina et al., 2020; Rezaee & Ghasemi, 2014). Another factor affecting LBP was high BMI level (Al Amer, 2020).

Research indicates that physical factors play a crucial role in the onset of LBP among nurses. In particular, inadequate ergonomic conditions, along with tasks like patient transportation, lifting, and manual handling, are recognized as factors that elevate the risk of both acute and chronic LBP in nurses (Al Amer, 2020; Brusini, 2021; Lee et al., 2015; Rezaee & Ghasemi, 2014; Yassi & Lockhart, 2013).

Research has highlighted the significant impact of psychosocial factors on the development of LBP and musculoskeletal disorders (MSDs) in various professions. (Huang et al., 2002; Woods, 2005). In a study, high workload / low control increased the odds of having LBP among nurses OR:1.56 (95% CI:1.22-1.99) and 1.52 (95% CI:1.14-2.01) times more and low social support increased the odds of having back pain 1.82 (95% CI:1.43-2.32) times more. Furthermore, an imbalance between effort and reward has been found to elevate the risk of pain in any part of the body by 6.13 times (95% CI: 5.32–7.07) (Bernal et al., 2015). A study identified a significant link between nonspecific LBP in nurses and their perception of overload [OR:3.13 (95% CI: 1.62–6.05]. Inefficient work organization and adverse working conditions have been identified as factors that elevate the risk of LBP. (Cargnin et al., 2019). In the meta-analysis study, between high workload and experiencing neck pain or discomfort [OR 1.55 (95% CI: 1.39-1.72)] and between effort-reward imbalance and experiencing pain or discomfort in any body region [OR 2.56 (95% CI: 1.59-4.11)] a significant relationship was found (Ballester Arias & García, 2017). Another meta-analysis found a notable connection between LBP and work-related stress [OR: 1.71 (95% CI: 1.15-2.55)], as well as physical strain [OR: 1.76 (95% CI: 1.32-2.35)] (Du et al., 2021). The findings highlight a significant connection between workplace psychosocial factors and LBP in nurses. However, the role of social support as a potential moderator in this relationship has yet to be thoroughly investigated.

The purpose of this present study is to determine the prevalence of low back pain among nurses working in intensive care units and the association between psychosocial factors and low back pain.

MATERIAL AND METHODS
Study group
This research was carried out using a cross-sectional design and involved 127 nurses working in the ICUs of an urban hospital. The aim of the study was to reach all nurses working in ICUs. Of the nurses in the target population, 78.8% were reached.
Data collection tools
Data for the study were gathered through face-to-face interviews with participants, using a structured questionnaire.

The questionnaire comprises two sections: The first section consists of sociodemographic information of nurses (e.g., age, gender, parental status, night shift work, employment status, and weekly working hours), while the other assesses the severity of LBP in the past month and associated psychosocial factors. In addition, two measurement instruments were used to determine the psychosocial factors of the

employees. The initial section includes the Swedish Demand-Control-Support Questionnaire, followed by the Effort-Reward Imbalance scale in the second part.

Swedish Demand-Control-Support Questionnaire: One of the scales is the Swedish Demand-Control-Support Questionnaire. The questionnaire was adapted into Turkish by Demiral based on Karasek's Demand-Control-Support Questionnaire (Sanne et al., 2005). The scale, consisting of 17 items, had 4-point Likert-type response options. The scale is used to assess the psychological demands (workload), decision latitude (control) and social support. Job Strain scores were calculated through dividing the workload score by the decision latitude score. The decision latitude subscale includes an item called "job strain". If the score obtained from this item is higher than 1, it indicates increased job strain (Demiral et al., 2007).

Effort-Reward Imbalance Scale: The second scale employed in this study is Siegrist's Effort-Reward Imbalance scale (Siegrist et al., 2014). The scale consists of 3 dimensions and 23 items. The scale has three subscales: effort, reward and overcommitment. Imbalance scores were calculated through dividing the effort score by the reward score. Effort-Reward Imbalance scale adapted from Demiral et al. (Demiral et al., 2012).

Variables

The key outcome metric for this study is work-related LBP suffered within the last month. The participants were asked a single question and requested to respond as either "yes" or "no".

The independent variables of the present study included questions on working conditions and relationships in the workplace in addition to sociodemographic characteristics of individuals. Among the questions are the types of employment contract, working hours (night shift, shift work), weekly working hours. In addition, psychosocial scales scores were determined using questionnaires.

Statistical analysis

SPSS 15v was used to analyze the factors affecting low back pain. Univariate chi-square and t tests, multivariate logistic regression analysis were applied. The findings derived from the logistic regression analysis are expressed in terms of odds ratios (OR) accompanied by 95% confidence intervals (95% CI).

Ethical considerations

All protocols involving human participants adhered strictly to the ethical guidelines set forth by the appropriate institutional and national research authorities. Moreover, the study adhered to the principles outlined in the 1964 Helsinki Declaration, including its subsequent revisions. Additionally, the research followed other relevant ethical guidelines. The Ethics Committee of Tepecik Education and Research Hospital granted approval for the study protocol (approval no/date: 47/24/4/2013/36). The institutional review board confirmed the informed consent process. All participants provided informed consent after receiving a comprehensive explanation about the study's goals, potential benefits, and the confidentiality protocols to ensure their privacy.

Table 1. Sociodemographic characteristics and the prevalence of LBP among nurses.

Variables			n	%
Gender	Male		16	12.6
	Female		111	87.4
Having children	Yes		52	40.9
	No		75	59.1
Marital status	Married		71	55.9
	Single		56	44.1
Smoking status	Smoker		61	48.0
	Former smoker		16	12.6
	Never smoker		50	39.4
Presence of a chronic disease	Yes		20	15.7
	No		107	84.3
Inappropriate ergonomic behaviors	Sometimes		33	26.0
	Always		94	74.0
Working the nightshift	Yes		116	91.3
	No		11	8.7
Employment status	Contracted employee		19	15.0
	Permanent employee		108	85.0
Intensive care unit worked in	Pediatric		44	34.6
	Adult		83	65.4
LBP (within the last month)	Yes		90	70.9
	No		37	29.1
		Mean±SD	**Median (min-max)**	
Recurrence of LBP (within the last month)		7.6±7.8	4 (1-30)	
Age		32.4±6.3	33 (20-57)	
Weekly working hours		49.1±7.0	48 (40-80)	
Professional seniority		11.0±6.8	11 (1-28)	

RESULTS

65.4% of the participants worked in adult ICUs, while 34.6% were employed in pediatric ICUs. 87.4% were female, 55.9% were married, 91.3% worked the night shift and 15.0% were employed contracted. The participants' mean age was 32.4 ± 6.3 years (Table 1). About three-fourths (70.9%) of the participants suffered LBP within the last month. The median frequency of LBP recurrence in the last month is 4.

While some of the participants had LBP complaints after their shifts, some had LBP because they lifted patients, had to work standing or had to give care to the patient in an inappropriate position.

Based on the univariate analysis, female participants and those working the night shift suffered LBP more. In addition, those who lacked social support and achieved high effort and low reward scores suffered LBP more (Table 2).

Table 2. Univariate analysis of variables linked to LBP in nurses.

Variables	Low back pain				χ^2	p
	Yes		**No**			
Gender	**n**	**%**	**n**	**%**		
Male	6	37.5	10	62.5	9.871	**0.002**
Female	84	75.7	27	24.3		
Having children						
Yes	39	75.0	13	25.0	0.729	0.393
No	51	68.0	24	32.0		
Smoking status						
Smoker	45	73.8	16	26.2		
Former smoker	12	75.0	4	25.0	0.955	0.620
Never smoker	33	66.0	17	34.0		
Presence of chronic disease						
Yes	12	60.0	8	40.0	1.358	0.244
No	78	72.9	29	27.1		
Inappropriate ergonomic behaviors						
Sometimes	19	57.6	14	42.4	3.814	0.074
Always	71	75.5	23	24.5		
Working the nightshift?						
Yes	86	74.1	30	25.9	6.944	**0.008**
No	4	36.4	7	63.6		
Employment status						
Contracted employee	13	68.4	6	31.6	0.065	0.799
Permanent employee	77	71.3	31	28.7		
Intensive care unit worked in						
Pediatric	35	79.5	9	20.5	2.456	0.117
Adult	55	66.3	28	33.7		
Quantitative variables	**n**	**Mean±SD**	**n**	**Mean±SD**	**t**	**p**
Workload	90	94.7±11.1	37	91.9±12.5	1.247	0.215
Decision latitude (control)	90	65±20.1	37	70.2±20.2	-1.329	0.186
Job strain	90	1.4±0.3	37	1.3±0.3	1.503	0.135
Social support	90	53.5±21.6	37	63.4±17.4	-2.461	**0.015**
Effort	90	20.4±4.3	37	18.5±4.9	2.126	**0.035**
Reward	90	29.5±10.6	37	34.2±12.0	-2.215	**0.029**
Effort-reward imbalance	90	1.9±1.0	37	1.5±0.9	1.924	0.057
Overcommitment	90	16.7±3.6	37	16.2±3.7	0.710	0.479
Age	90	32.3±6.6	37	32.6±5.6	-0.254	0.800
Weekly working hours	90	49.7±7.5	37	47.4±5.6	1.709	0.090
Professional seniority	90	10.9±6.9	37	11.3±6.8	-0.289	0.773

SD: standart deviation.

Based on the final reduced model results from the multivariate logistic regression analysis, women [OR: 6.56 (95% CI: 1.98-21.73)] and those who worked the night shift [OR: 6.62 (95% CI: 1.68-26.09)] suffered back pain more. The findings also indicated that having social support at work [OR:0.97 (95%CI:0.95-0.99)] provided a protective effect against LBP (p < 0.05) (Table 3).

Table 3. Factors linked to LBP in nurses and outcomes from the reduced final logistic regression model.

Variables	OR [95% CI]
Age	Ns
Gender (female)	6.56 [1.98-21.73][**]
Working the nightshift	6.63 [1.68-26.09][**]
Social support	0.97 [0.95-0.99][*]
Effort	Ns
Reward	Ns

Ns: Non Significance; [*]p<0.05; [**]p<0.01

DISCUSSION
In this investigation, 70.9% of the participants indicated that they had experienced LBP during the past month. However, prevalence rates vary across studies. For instance, an older study reported a six-month prevalence of LBP lasting three or more days at 28.0%. (Skovron et al., 1987). In contrast, a study conducted among Italian nurses reported one-year prevalence of LBP as high as 86% (Corona et al., 2005). Among Japanese nurses, the four-week prevalence of LBP was reported as 58.7%, while the annual prevalence was 75.9% (Fujii et al., 2019). A study conducted in Turkiye reported a lifetime prevalence of LBP at 84.0%, while the point prevalence was found to be 63.0% (Arasan et al., 2009). A study by Lee et al. carried out in California found that 61.7% of nurses across various healthcare sectors experienced low back pain. In the same investigation, 71.4% of nurses in long-term care units reported experiencing LBP, consistent with the results of the current study (Lee et al., 2015). The findings indicated that the variations in LBP severity were influenced not only by the methods of measurement but also by the participants' perceptions of their pain. Therefore, it is crucial to obtain baseline results during staff recruitment and follow up at regular intervals, as this ensures the comparability and consistency of the findings over time.

In this research, female participants and those who worked the night shift suffered LBP more. Many studies with similar findings have reported that LBP is more prevalent among female nurses (Abolfotouh et al., 2015; Al Amer, 2020; Choobineh et al., 2010; Rezaee & Ghasemi, 2014; Sun et al., 2021) and among women working in other professions (Cherry et al., 2001; Strazdins & Bammer, 2004) than was LBP among their male counterparts. In their study, Dahlberg et al. reported that of the men and women engaged in similar types of work, women suffered a higher incidence of musculoskeletal symptoms. This is probably not only because of biological differences but also because of ergonomic disposition inappropriate for the female body and non-paid activities such as housework, childcare, etc. which are mostly carried out by women (Dahlberg et al., 2004). Strazdins & Bammer reported that being female or parent made the participants more vulnerable to musculoskeletal problems (Strazdins & Bammer, 2004). In the present study, gender-related factors were also considered as potential contributors to LBP. Despite expectations, age did not show a significant link to the development of LBP. A similar result was determined in the meta-analysis study of Sun et al. (Al Amer, 2020; Sun et al., 2021). This lack of significant relationship may be attributed to the relatively young age group in the study, which had similar exposures to the risk factors for LBP.

Alternatively, working at nights necessitates long working hours without a break, and giving care to, lifting and transporting of patients with no help.

Difficult interventions performed alone and without support especially by nurses providing patient care (Lee et al., 2015; Rezaee & Ghasemi, 2014; Serranheira et al., 2012), working the night shift and long working hours have been reported as risk factors in various studies (Abolfotouh et al., 2015; Strazdins & Bammer, 2004; Sun et al., 2021). The nurses participating in this present study worked 12 hours or longer on the night shifts. Thus, when they worked the night shift, they were exposed to physical burden for longer periods.

No significant relationship was determined between LBP and two of the psychosocial factors investigated by this study: workload and control. The findings of various studies examining the link between psychosocial factors and LBP differ across research. Alexopoulos et al. conducted two studies. The first study revealed no significant correlation between workload and LBP (Alexopoulos et al., 2003), however, in the second one, they determined that workload affected LBP of Dutch nurses but not that of Greek nurses (Alexopoulos et al., 2006).

In the study by Bos et al., the univariate analysis showed a significant association between workload and LBP, particularly among those working in ICUs. However, in multivariate comparisons, the relationship was not significant (Bos et al., 2007). Similar results were obtained in Magnago et al.'s study too (De Souza Magnago et al., 2010). However, several other studies have reported a significant association between LBP and psychosocial stress. (Choobineh et al., 2010; Du et al., 2021; Golabadi et al., 2013).. In Bernal et al.'s meta-analysis, excessive workload and low control have been found to affect LBP (Bernal et al., 2015). In this study, participants with LBP exhibited higher workload scores and lower control scores, but the association was not statistically significant. The findings could be influenced by the limited sample size, as the study did not encompass the entire population.

In this study, univariate analysis identified a significant association between LBP and the effort-reward imbalance within the psychosocial factors. Nonetheless, the multivariate analysis did not show a significant relationship. The literature reveals a gap in studies exploring the connection between musculoskeletal complaints and effort-reward imbalance. In Weyers et al.'s study, a significant relationship was reported between musculoskeletal complaints and the effort-reward imbalance among Danish nurses (Weyers et al., 2006). In their study, Herin et al. investigated upper body-related complaints and found a significant relationship those complaints and the effort-reward imbalance (Herin et al., 2011). Similar results were reported in the meta-analysis study of Ballester Arias & García (2017), as a significant relationship between effort/reward imbalance and pain/discomfort in any body region (Ballester Arias & García, 2017). In the present study, no part of the upper body was investigated; only its

relationship with LBP was determined. The results were relatively consistent with the results in the literature.

Many studies in the literature have primarily focused on the health outcomes associated with physical exposure (Barzideh et al., 2014; Habibi et al., 2012; Rezaee & Ghasemi, 2014). On the other hand, social support, an important impact factor among psychosocial factors, has an important place because social support at work can change harmful effects of physical and ergonomic conditions. Therefore, many studies and reviews report that social support is significantly associated with health outcomes (Hughes et al., 1997; Sadeghian et al., 2015; Skov et al., 1996; Urquhart et al., 2013; Woods, 2005). In this study, social support was significantly linked to LBP in both univariate and multivariate analyses.

Limitations and Strengths
The present study has both advantages and limitations. A key constraint of this research is the small number of participants. Another limitation is that the study involved only nurses from ICUs, which may limit the applicability of the findings to other healthcare settings. One more limitation to consider is its cross-sectional design, which restricts the ability to draw definitive conclusions about causal relationships. One of the key strengths of this study lies in its recruitment of nurses working exclusively in ICUs. The use of direct interviews in data collection further boosts the credibility of the study's findings.

CONCLUSION
The absence of adequate social support was identified as a significant contributor to the progression of LBP in ICU nurses. Additionally, univariate analysis indicated that the imbalance between effort and reward was a significant modifier. The results indicate that psychosocial risk factors have a significant impact on nurses working in ICUs. To prevent LBP, it is essential to provide adequate social support and ensure a balanced effort/reward structure. Conducting similar studies in the future through follow-ups will help better understand cause-effect relationships of psychosocial factors in MSDs among nurses.

Conflict of Interest
The authors declare no potential conflicts of interest regarding the research, authorship, and/or publication of this article.

Author Contributions
Plan, design: HB, SV, BU, EY; **Material, methods and data collection:** HB, SV, BU, EY; **Data analysis and comments:** HB, SV; **Writing and corrections:** HB, SV, BU, EY.

Ethical Approval
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