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ORIGINAL ARTICLE

Low back pain frequency and the related risk factors in nurses and caregivers

Hemşire ve bakım verenlerde bel ağrısı sıklığı ve ilişkili risk faktörleri

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Summary

Objectives: The objective of this study is to investigate the frequency of low back pain and the relationship between low back pain and personal and occupational risk factors in hospital employees.

Methods: The study sample consisted of 270 nurses and 189 caregivers working in a university hospital. Demographic characteristics, low back pain history, and low back pain risk factors were queried by self-report questionnaires. The Biering-Sorensen Test was used to evaluate the endurance of trunk extensor muscles. Also, the Oswestry Disability Index (ODI) and Hospital Anxiety and Depression Scale (HADS) were used.

Results: Of the hospital employees included in the study, 56.5% had low back pain in the last month, and 81.9% had a history of low back pain. The frequency of low back pain was significantly higher among those who work in a stressful working environment, stand for extended periods, lift patients or heavy subjects without using a lifting device, and transfer patients alone. In addition, it was determined that those who exercise regularly and are satisfied with their job had significantly less low back pain ($p<0.05$). The mean Biering-Sorensen test difference between the two groups was statistically significant ($p<0.001$). There was a significant difference between the groups with and without low back pain in terms of HADS-Anxiety and HADS-Depression subscale scores.

Conclusion: The study findings indicated that being a hospital worker is a risk factor for low back pain, and the decrease in the strength and endurance of the lower back muscles increases the risk of low back pain.

Keywords: Biering-Sorensen test; caregiver; low back pain; nurse; Oswestry Disability Index.

Özet

Amaç: Bu çalışmanın amacı, hastane çalışanlarında bel ağrısı sıklığını ve bel ağrısı ile kişisel ve mesleki risk faktörleri arasındaki ilişkiyi incelemektir.

Gereç ve Yöntem: Araştırmanın örneklemini bir üniversite hastanesinde çalışan 270 hemşire ve 189 hasta bakıcı oluşturmaktadır. Demografik özellikler, bel ağrısı öyküsü ve bel ağrısı risk faktörleri kişisel bildirim anketleri ile sorgulandı. Gövde ekstansör kaslarının dayanıklılığını değerlendirmek için Biering-Sorensen Testi kullanıldı. Ayrıca Oswestry Engellilik İndeksi (ODI) ve Hastane Anksiyete ve Depresyon Ölçeği (HADÖ) kullanıldı.

Bulgular: Çalışmaya alınan hastane çalışanlarının %56.5'inde son bir ayda bel ağrısı, %81,9'unda ise bel ağrısı öyküsü vardı. Stresli bir çalışma ortamında çalışanlarda, uzun süre ayakta duranlarda, hasta veya ağır nesneleri kaldırma aracı kullanmadan kaldıranlarda ve hastaları tek başına nakledenlerde bel ağrısı sıklığı anlamlı olarak daha yüksekti. Ayrıca, düzenli spor yapan ve işinden memnun olanların bel ağrılarının anlamlı olarak daha az olduğu belirlendi ($p<0.05$). Biering-Sorensen testi ortalamasında iki grup arasındaki fark istatistiksel olarak anlamlıydı ($p<0.001$). Bel ağrısı olan ve olmayan gruplar arasında HAD-Anksiyete ve HAD-Depresyon alt ölçek puanları arasında anlamlı fark vardı.

Sonuç: Araştırma bulguları, hastane çalışanı olmanın bel ağrısı için bir risk faktörü olduğunu ve bel kaslarının kuvvet ve dayanıklılığındaki azalmanın bel ağrısı riskini artırdığını göstermiştir.

Anahtar sözcükler: Bakıcı; bel ağrısı; Biering-Sorensen testi; hemşire; Oswestry Engellilik İndeksi.

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Introduction

Many occupational and personal factors pose a risk for low back pain (LBP). The National Institute of Occupational Health and Safety reported that the cause of low back pain in more than 60% of the cases is the exertion of excessive force. Given that they are exposed to many chronic traumas, hospital employees are one of the groups at risk for LBP.[1] Compared to 20%–50% of the employees who are affected by LBP abroad, 30%–70% of the employees are reportedly affected by LBP in Türkiye.[2,3] Many studies have demonstrated a decrease in abdominal and spinal muscle strength of patients with LBP. Some of these studies reported weakness in lumbar extensors, whereas others reported weakness in flexors.[4] It has also been reported that LBP is more common in individuals who have an inactive lifestyle and do not exercise regularly.[5] In this context, strengthening the waist and abdominal muscles and performing exercises to increase flexibility are recommended for low back health in many sources.[6] In parallel, it was demonstrated in a study that performing physical activity at least three hours a week reduces the risk for LBP.[7] On the other hand, chronic pain has adverse effects on mental health, a significant parameter of quality of life. Along these lines, it has been reported that depression and anxiety symptoms were observed in 42.2% and 37% of the individuals with chronic pain, respectively.[8] In another study, it was determined that 55% of the patients with chronic LBP had anxiety and 48.57% had depression.[9] In addition, it has been shown that pain becomes more chronic in patients with premorbid psychological stressors such as anxiety or depression.[10]

In light of the foregoing, this study was carried out to investigate the frequency of LBP, and the relationship between LBP and personal and occupational risk factors in hospital employees, i.e., nurses and caregivers, who are in the occupational risk group for LBP.

Material and Methods

This study population comprised hospital employees between the ages of 20 and 40 who work as nurses and caregivers at Bülent Ecevit University (BEU) Health Research and Application Center. Written informed consent was obtained from each participant. The study protocol was approved by the institutional Ethics Committee (Approval Date&Number: 2012-30-06/03). The study was conducted in accordance with the principles set forth in the Declaration of Helsinki. The study sample consisted of a total of 459 hospital employees, 270 (58.8%) nurses and 189 (41.2%) caregivers. Compared to 75.2% of the nurses, 59.2% of the caregivers working at the hospital agreed to participate in the study. Hospital employees with inflammatory LBP, a history of lumbar spine fracture, neurological diseases that increase the risk of LBP, i.e., polio, etc., congenital hip dislocation, and leg length differences were not included in the study. Participants' demographic characteristics, lifetime of LBP and LBP risk factors were determined through self-report questionnaires. Accordingly, Biering-Sorensen test was used to evaluate the endurance of lumbar and back extensor muscles, Oswestry Disability Index (ODI), also known as the Oswestry LBP Disability Questionnaire, was used to evaluate the functional disability due to LBP, and Hospital Anxiety and Depression Scale (HADS) was used to determine the anxiety and depression levels, the related risk factors, and the changes in the severity of anxiety and depression.

The Biering-Sorensen test is a muscle performance test used to determine the endurance of the lumbar and back extensor muscles. The purpose of the test is to determine how many seconds the upper part of the body (the part above the iliac wings) can remain in the horizontal position without support. The test is terminated if the individual feels extreme fatigue or pain, cannot keep his/her trunk in a horizontal position, or if his/her other symptoms worsen. During the test, an inclinometer is placed in the interscapular space and if a tilt of more than 10 degrees is detected in the upper body, the individual is warned to maintain the neutral position of his/her trunk. The time elapses from the beginning of the test till the time the individual cannot keep his/her trunk in neutral position is recorded in seconds.[11]

The ODI scale includes various questions about pain status, personal care, weight lifting, walking, sitting, standing, sleeping, sexual life, social life, and traveling. The validity and reliability studies of the Turkish version of the ODI scale were performed by Yakut et al.[12] in 2004. ODI consists of 10 items, each of which are scored from 0 to 5. The total score is multiplied by 2 and expressed as a percentage. The higher the total ODI score, the greater the LBP disability.

Table 1. Demographic characteristics of nurses and caregivers

	Nurses (n=270) Mean±SD	Caregivers (n=189) Mean±SD	Total (n=459) Mean±SD
Age (years)	28.96±3.4	34.35±4.68	31.18±4.78
Height (cm)	165.00±7.31	168.94±7.48	166.62±7.62
BMI	23.53±3.04	25.95±3.35	24.56±3.37

SD: Standard deviation, BMI: Body Mass Index.

Table 2. Frequency of low back pain in nurses and caregivers

Presence of low back pain	Nurses (n=270)		Caregivers (n=189)		p
	n	%	n	%	
Low back pain in the last 1 month	136	59.9	76	51.4	0.102
Lifetime of low back pain	227	84.1	149	78.8	0.151

Table 3. Comparison of Biering-Sorensen Test results, HADS-Anxiety and HADS-Depression Subscale and ODI scores of nurses and caregivers

	Nurses (n=270) Mean±SD	Caregivers (n=189) Mean±SD	p
Biering-Sorensen Test (sec.)	122.95±47.53	113.52±56.47	0.142
HADS-anxiety	7.79±3.36	8.36±3.53	0.111
HADS-depression	6.3±3.38	7.3±3.16	**0.001**
ODI	4.72±3.88	5.04±4.23	0.585

SD: Standard deviation; ODI: Oswestry Disability Index; HADS: Hospital Anxiety and Depression Scale.

HADS was used to determine the anxiety and depression levels, the related risk factors, and the changes in the severity of anxiety and depression. HADS consists of a total of 14 items, with 7 items each in the anxiety (odd-numbered questions) and depression (even-numbered questions) subdimensions. The cut-off scores for the HADS anxiety and depression subscales are 10 and 7, respectively. Individuals whose scores are higher than these cut-off scores are considered to be in the risk group. Turkish translation and adaptation studies of HADS were completed by Aydemir et al.[13]

The statistical analyses were conducted with the SPSS 23.0 software package. The descriptive statistics obtained from the research data were expressed as numbers (n) and percentage (%) values in the case of categorical variables and as mean±standard deviation and median (min-max) values in the case of continuous variables. Shapiro-Wilk's test was used to test the conformance of continuous variables to the normal distribution. Mann-Whitney U test was used to compare the groups featuring continuous variables determined not to conform to the normal distribution. Pearson's chi-square and Fisher's exact chi-square tests were used to compare the groups featuring categorical variables. The risk factors that are thought to affect LBP were analyzed by logistic regression analysis. Probability (p) values of <0.05 were deemed to indicate statistically significant.

Results

Of the 459 employees who participated in the study, 270 were nurses, midwives, medical assistants, and emergency medical technicians (who were all referred to as nurses for the purposes of this study), whereas 189 were caregivers who provide patient care and do cleaning in the units they work. The mean height, age, and body mass index (BMI) of nurses and caregivers are given in Table 1. There was no signifi-

Table 4. Demographic and clinical characteristics of employees with and without low back pain

	Employees with low back pain (n=376)	Employees without low back pain (n=83)	p
Age (years)	31.23±4.80	30.96±4.71	0.668
Gender			**0.023**
Male	228 (60.6%)	39 (47%)	
Female	148 (39.4%)	44 (53%)	
Height (cm)	166.54±7.74	167.01±7.12	0.434
BMI	24.76±3.42	23.66±2.93	**0.003**
Marital status			0.820
Married	261 (69.4%)	55 (66.3%)	
Single	112 (29.8%)	27 (32.5%)	
Divorced	3 (0.8%)	1 (1.2%)	
Having a child			0.060
Yes	228 (60.6%)	41 (49.4%)	
No	148 (39.4%)	42 (50.6%)	
Educational level			0.07
Primary education	91 (24.2%)	28 (33.7%)	
Secondary education	107 (28.5%)	21 (25.3%)	
Vocational school	63 (16.8%)	6 (7.2%)	
University	115 (30.6%)	28 (33.7%)	
Length of employment (months)	75.56±37.6	67.77±40.6	0.051
Smoking status			0.739
Nonsmoker	215 (57.2%)	47 (56.6%)	
Occasional smoker	78 (20.7%)	20 (24.1%)	
Chain smoker	83 (22.1%)	16 (19.3%)	
The status of doing regular exercise			**0.001**
Yes	38 (10.1%)	20 (24.1%)	
No	338 (89.9)	63 (75.9%)	
Biering-Sorensen Test (sec)	110.92±49.11	153.50±47.57	**0.001**
HADS-anxiety	8.42±3.42	6.23±2.94	**0.001**
HADS-depression	6.86±3.30	6.04±3.39	**0.038**

BMI: Body Mass Index; HADS: Hospital Anxiety and Depression Scale.

cant difference between the nurses and caregivers in the frequency of LBP in the last 1 month or having a lifetime of low back pain (p>0.005) (Table 2) or in terms of Biering-Sorensen test results and the scores obtained from the HADS-Anxiety subscale and ODI scale (p>0.005). On the other hand, the mean HADS-Depression Subscale score of caregivers was significantly higher than those of nurses (p=0.001) (Table 3).

Further analysis of the study group in terms of having LBP revealed no significant difference between those with and without LBP in terms of age, length of employment, marital status, having a child, and educational level. On the other hand, the two groups significantly differed in BMI, Biering-Sorensen test results, and HADS-Anxiety and HADS-Depression Subscale scores. There was also a significant difference between those with and without LBP in terms of gender. Accordingly, the rate of females was significantly higher in the group with LBP compared to the group without LBP. In addition, it was determined that those who exercised regularly had significantly less LBP than those who do not (Table 4). No significant relationship was found between LBP and the unit where the employee has been working, the type of shift working, i.e., night shift/on duty, day

Table 5. Employment characteristics of employees with and without low back pain

	Employees with low back pain (n=376)	Employees without low back pain (n=83)	p
The unit where the employee has been working			0.207
Office	151 (40.2%)	43 (51.8%)	
Surgical ward	139 (37.0%)	27 (32.5%)	
Intensive care service	66 (17.5%)	9 (10.8%)	
Emergency service	20 (5.3%)	4 (4.8%)	
Type of shift working			0.650
Night shift/on duty	193 (51.3%)	45 (54.2%)	
Day shift	90 (23.9%)	16 (19.3%)	
Variable	93 (24.7%)	22 (26.5%)	
Total weekly working hours			0.75
40 hours	91 (24.2%)	12 (14.5%)	
41 hours or more	285 (75.8%)	71 (85.5%)	
Stressful working environment			<0.001
Yes	307 (81.6%)	50 (60.2%)	
No	69 (18.4%)	33 (39.8%)	
Job satisfaction			**<0.001**
Yes	250 (66.5%)	73 (88%)	
No	126 (33.5%)	10 (12%)	
Standing for extended periods			**0.024**
Yes	349 (92.8%)	70 (84.3%)	
No	27 (7.2%)	13 (15.7%)	
Remaining in the same position for extended periods			0.055
Yes	246 (65.4%)	45 (54.2%)	
No	130 (34.6%)	38 (45.8%)	
Engaging in repetitive movements			0.165
Yes	332 (88.3%)	68 (81.9%)	
No	44 (11.7%)	15 (18.1%)	
Lifting patients or heavy subjects			**0.023**
Yes	281 (74.9%)	52 (62.7%)	
No	94 (25.1%)	31 (37.3%)	
Transferring patients alone			**0.011**
Yes	139 (37%)	18 (21.7%)	
No	237 (63%)	65 (78.3%)	

shift, or variable shift, and the total weekly working hours. On the other hand, there was a significant relationship between LBP and working in a stressful working environment (p<0.001). In parallel, LBP was more frequent among those who stated that they are working in a stressful working environment. LBP was significantly lower in employees who were satisfied with their work than those who were not satisfied (p<0.001) (Table 5).

Analysis of the relationships between LBP and working positions indicated that LBP is significantly correlated with 'standing for extended periods', 'lifting patients or heavy subjects without using a lifting device', and 'transferring patients alone'. The logistic regression analysis performed by taking the factors affecting LBP revealed that the rate of employees with LBP was 1.73 times higher among female employees than in the study group. Addi-

Table 6. Logistic analysis of factors affecting low back pain

Variables	OR	Beta coefficient	p	95% OR CI	
				Lower	Upper
Age	0.988	-0.012	0.651	0.940	1.039
BMI					
≤25	1				
>25	0.511	0.671	**0.010**	0.307	0.852
Total weekly working hours					
≤40 hours	1				
≥41 hours	0.529	0.636	0.057	0.275	1.020
Stressful working environment					
No	1				
Yes	2.937	1.077	**0.000**	1.761	4.897
Regular exercise					
No	1				
Yes	2.68	-1.038	**0.001**	1.593	5.648
Gender					
Male	1				
Female	1.738	0.553	**0.023**	1.077	2.804
Job satisfaction					
No	1				
Yes	2.84	-1.303	**0.000**	1.536	5.544
Standing for extended periods					
No	1				
Yes	2.401	0.876	**0.016**	1.181	4.881
Remaining in the same position for extended periods					
No	1				
Yes	1.598	0.469	0.056	0.988	2.586
Lifting patients or heavy subjects					
No	1				
Yes	1.782	0.578	**0.024**	1.078	2.945
Transferring patients alone					
No	1				
Yes	2.118	0.750	**0.009**	1.207	3.717

OR: Odds ratio; CI: Confidence interval; BMI: Body Mass Index.

tionally, it was found that standing for extended periods and transferring patients alone increased the risk for LBP by 2.40-fold and 2.11-fold, respectively, whereas regular exercise and job satisfaction decreased the risk for low back pain by 2.68-fold and 2.84-fold, respectively. In terms of total weekly working hours, there is a 0.52-fold increase in low back pain in those who work ≥41 hours. There was a 0.51-fold increase in low back pain in employees with a BMI>25 (Table 6).

Discussion

Hospital employees are one of the groups at risk for occupational musculoskeletal system problems. Nursing and caregiving are professions that include many of the risk factors for LBP and can be both physically and psychologically challenging.[14] As a matter of fact, 81.9% of all participants included in this study, 84.1% of the nurses and 78.8% of the caregivers, had a lifetime of LBP. Similarly, 56.5% of all participants, 59.9% of the nurses and 51.4% of

the caregivers, indicated that they have experienced LBP in the last 1 month. However, the results of the relevant epidemiological studies available in the literature are not consistent. A systematic review and meta-analysis study reported that the prevalence of LBP in nurses in the studies available in the literature range between 34.5% and 100.0%.[15] Accordingly, even though the prevalence of LBP found in this study is high, it still falls within the said range.

The increased mechanical strain from obesity is thought to cause LBP through excessive wear and tear. Excess weight, especially in the abdomen, increases the lumbar lordosis, strains the ligaments and muscles, and may cause damage by putting pressure on the discs.[16] In parallel, a review of epidemiological studies revealed a significant relationship between weight gain and LBP.[17] Two studies conducted with nurses and hospital employees reported that high BMI values increased the prevalence of LBP.[18] Similarly, a significant relationship was found between BMI and having a lifetime of LBP in this study, as well.

Based on the findings of this study, there was no significant relationship between marital status and LBP. The results of the studies on the relationship between marital status and LBP available in the literature are contradictory. Some studies reported that LBP was more common among married hospital employees,[18,19] whereas others did not find a significant relationship between marital status and LBP.[20,21]

Numerous studies have been conducted on the risk factors for LBP. Some of these studies reported that smoking is associated with LBP.[22,23] It has been speculated that smoking reduces blood flow in the lumbar vertebrae and muscles by causing vasoconstriction in the vessels, renders the disc more sensitive to external factors by disrupting the nutritional flow in the discs, and thus poses a risk for LBP.[23] There are also studies which argued that there is no relationship between smoking and LBP.[24,25] In comparison, the rate of smokers among all employees included in this study was 43%. However, there was no significant difference between the groups with and without LBP in smoking frequency.

The findings of this study demonstrated that LBP in employees who stated to have been working in a stressful working environment and in those who are not satisfied with their work was significantly higher than others. The logistic regression analysis revealed that the risk for LBP is 2.84 times less in employees with job satisfaction. Work stress can increase the frequency of LBP by lowering the pain threshold, causing muscle tension resulting in pain, and negatively affecting the psychological and emotional state of the person. In addition, distractions caused by stress can lead to LBP due to work accidents.[26] The psychophysical risk factors in the workplace include extended work times, being mandated to finish too much work in a limited period, dislike for work, lack of dialogue with colleagues and managers, and not getting support.[27] In the study conducted by Nas et al.[28] in Türkiye, it was found that stressful working conditions increased the risk for LBP. The departments studied in our research were examined in four groups as internal units, surgical sciences, intensive care, and emergency.

The employees included in this study were working in four different units: offices, surgical ward, intensive care service, and emergency service. There was no significant difference between the groups created according to the units where the employees were working in terms of LBP. There are studies in the literature that reported an increased risk for LBP in employees who have been working in surgical wards,[29,30] and others that reported no significant difference between the groups created according to the units where the employees were working in terms of LBP, as found in this study.[24]

There is also a significant relationship between shift work and LBP. This association may be explained by the reduction in the duration and quality of sleep due to night shift work, resulting in muscle injury.[21] On the other hand, Langerström stated that nurses working in the day shift are exposed to lower back pain more than those working in the night shift since they handle more patients and face more demands.[31] Then again, some studies found no significant difference between types of shift working in terms of LBP.[18–20] Similarly, no significant difference was found in this study between the groups created according to the types of shift working in terms of LBP.

Occupational risk factors play an important role in the development of LBP. Some of the occupational risk factors mentioned in the literature include lifting patients or heavy subjects without using a lifting device, transferring patients alone, remaining

in the same position for extended periods, engaging in repetitive movements, and standing for extended periods.[32] In this context, caregivers who lift patients alone and nurses who mostly stand and work in unhealthy positions were identified as risky groups in terms of LBP.[32,33] In parallel, the frequency of LBP was found to be significantly higher among those who stand for extended periods, lift patients or heavy subjects without using a lifting device, and transfer patients alone.

Many studies reported that good physical condition reduces musculoskeletal damage and that LBP symptoms are less common in individuals with sufficient muscle strength, endurance, and flexibility. The decrease in the endurance of the trunk muscles lowers the fatigue threshold. In parallel, the structures in the lumbar region are injured more easily. Therefore, decreased endurance of trunk extensor muscles is a risk factor for nonspecific LBP.[34] In this context, exercise programs aim to create a natural corset by strengthening the trunk muscles.[34] As a matter of fact, an inverse relationship was reported between regular exercise and LBP in the studies of Bejai et al.[18] and Howell et al.[35] In the study conducted by Nas et al.[28] in Türkiye, it was found that low back pain is significantly less common in those who exercise regularly. However, the type of exercise was not specified in these studies. Along these lines, it was found in this study that regular exercise decreased the risk for LBP by 2.68-fold.

The Biering-Sorensen test is a muscle performance test performed to determine the endurance of the lumbar extensor muscles. The objective of the test is to determine the duration for which the upper body (the part above the iliac wings) can remain in an unsupported position. A number of studies in the literature reported that individuals with LBP have lower endurance than healthy people.[36,37] It has been speculated that people with weak back and low back muscle endurance have low fatigue thresholds and therefore can be easily exposed to trauma.[37] Decreased back and lumbar muscle endurance detected by the Biering-Sorensen test has been found to be a risk factor for LBP.[36] Similarly, a significant difference was found in this study between those with and without LBP in terms of Biering-Sorensen test results.

The practice of evaluating patients with pain in terms of their beliefs about their condition, coping methods, psychological adjustment, and effectiveness levels, in addition to their medical findings, is becoming widespread. Symptoms that often accompany chronic pain are depression, anxiety, physical dysfunction, and social isolation.[38] HADS is a self-report scale applied to determine the anxiety and depression levels, the related risk factors, and the changes in the severity of anxiety and depression. Many studies have found significant correlations between anxiety, disability and pain severity, and HADS-Anxiety and HADS-Depression subscale scores.[39–41] In parallel, a significant difference was found in this study between the groups with and without LBP in terms of HADS-Anxiety and HADS-Depression subscale scores. Accordingly, HADS-Anxiety and HADS-Depression scores were significantly higher in the group with LBP.

In short, LBP causes serious social problems by causing disability and loss of ability to work, without directly causing death in people. Disability, which occurs as a result of decreased daily activities and loss of function, is a condition that negatively affects an individual's well-being and quality of life. Long-term disability and job loss not only cause problems for individuals but also for their dependents and society.

Occupational LBP caused by practices involving direct and indirect patient care is one of the most commonly encountered health risks in hospital employees. Adaptation of ergonomic methods to working life, use of lifting aids and devices, organization of training programs, proper use of body mechanics, and ensuring physical condition are among the practices that can be effective in preventing/reducing low back pain. In addition, risks that may cause LBP in the working environment should be determined, and safety practices aimed at protecting health should be implemented.

Ethics Committee Approval: The Zonguldak Karaelmas University Clinical Research Ethics Committee granted approval for this study (date: 03.04.2012, number: 2012-30-06/03).

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