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Low back pain and risk factors among Taxi drivers in Turkey: a cross-sectional study

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Keywords: Taxi driver; low back pain; Turkey; ergonomics

Abstract

Background: *Taxi drivers have an increased risk of low back pain due to both physical and occupational conditions. This study aims to determine the prevalence of low back pain and occupational risk factors among taxi drivers working in Izmir, Turkey.* **Methods:** *This study was conducted with 447 taxi drivers at randomly selected taxi stands between April and September 2021. The questionnaire included demographic, individual, and work-related questions; the Nordic Musculoskeletal Questionnaire; and the Back Pain Functional Scale (BPFS).* **Results:** *The prevalence of low back pain in the last year was 49.7%. In multivariate logistic regression analyses, the risk factors for low back pain included having a body mass index of 25-29.9 kg/m^2 (OR= 1.67, 95% CI 1.01-2.76) or ≥30 kg/m^2 (OR= 2.15, 95% CI 1.19-3.87), no physical activity (OR= 1.66, 95% CI 1.06-2.62), years of work >10 (OR= 3.23, 95% CI 1.89-5.53), no weekly rest period (OR= 3.11, 95% CI 1.42-6.81), having no lumbar support on the driver's seat (OR=1.67, 95% CI 1.05-2.66), or undecisive job satisfaction (OR= 2.07, 95% CI 1.17-3.66). Being undecided about job satisfaction (OR= 2.34, 95% CI 1.15-4.92) and not having physical activity (OR= 2.10 CI 1.08-4.08) were found to be risk factors for reduced BPFS scores.* **Conclusion:** *A strong correlation was found between the frequency of low back pain and the BPFS score and occupational factors. Early detection and management of low back pain are critical to avoid increased low back pain and related injuries among taxi drivers.*

1. Introduction

According to the annual report of the European Agency for Safety and Health at Work (EU-OSHA) for the year 2000, occupational low back pain (LBP) is any LBP that originates from the work environment and is clinically considered to be caused or aggravated by the person's occupation [1]. The LBP due to occupational exposures was estimated to cause 21.7 million disability-adjusted life years (DALYs) in 2010 worldwide, and it is among the top 10 diseases and injuries that affected people more than any other disease group [2]. The financial, medical, and socioeconomic results of LBP have an impact on individuals, employers, and society at large [3]. In a study conducted in Turkey, the point prevalence of LBP was found to be 18.80%, while the lifetime prevalence was 77.40% [4].

Drivers are among the occupational groups with a higher incidence of LBP. It has been determined that professional drivers are at higher risk for lumbar spine degeneration, intervertebral disc slippage, sciatica, and non-specific LBP [5-7]. The prevalence of LBP among taxi drivers was found to be 54%, 48.5%, and 51% in studies conducted in China [8], Malaysia [9], and Taiwan [10], respectively. It has

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been reported that the main causes of LBP among professional drivers include driving for extended periods, vibration caused by the road, environmental factors, repetitive movements, psychosocial factors related to driving, and the driver's height, weight, and age [11-14]. In addition, it has been reported that ergonomic factors such as the shape of the driver's seat, seat inclination, sitting without lumbar support, and bending/twisting while driving were associated with the frequency of LBP among drivers [15-16].

With the rapid expansion of the transportation and tourism sector in the globalized world trade, taxi drivers have become a significant occupational group in this sector. Although there are studies evaluating the frequency of LBP and occupational risk factors among the drivers of various vehicles in different parts of the world, there are no studies on the LBP among taxi drivers in Turkey. Thus, this study aimed to evaluate the frequency of LBP among taxi drivers working in Izmir, Turkey, and to identify the associated occupational risk factors.

2. METHODS

2.1 Study setting and population

This study has a descriptive cross-sectional design and was conducted with taxi drivers working in Izmir, Turkey, between April and September 2021 by using the face-to-face interview method. With a population of approximately 4.5 million, Izmir is the third-largest city in Turkey. Approximately 4500 taxi drivers work in the metropolitan area of Izmir. Taxi drivers registered in Izmir were included in the study with the approval of Izmir Chamber of Merchants and Craftsmen for Drivers. The required sample size was calculated according to the formula for the prevalence in a group with known population size as below:

n (Sample size) =

$$Z^2_{1-\alpha/2} P(1-P) N \;\Big/\; d^2(N-1) + Z^2_{1-\alpha/2} P(1-P)$$

N: Size of the universe: 4500 taxi drivers.
P : The prevalence of LBP, which was approximated as 51.5% based on two studies investigating the prevalence of LBP among taxi drivers in China (54%) and Malaysia (48.5%).
d: Confidence interval, which was accepted as 5%.

$$Z_{1-\alpha/2} : 1.96$$

Thus, the minimum sample required for a 51.5%±5 % prevalence was found to be 354 people. The rate of non-response was predicted to be 25%, and 447 people were included in the study. 690 taxi drivers were reached, but 162 (23.4%) drivers refused to participate. Workers with a surgery history due to lumbar herniated disc (19 drivers) and 62 drivers with less than one year of employment were excluded. The survey was conducted among the drivers at randomly selected taxi stands through a face-to-face interview. Written informed consent was obtained from each individual participating in the study. The study received ethics approval from University of Health Sciences, Bozyaka Training and Research Hospital Ethics Committee.

2.2 Research instruments

A questionnaire designed by occupational diseases specialists was administered to the participants. The first part of the questionnaire included questions related to the demographic characteristics (age, height, weight, marital status, education level, smoking, and alcohol use), individual characteristics (physical activity, daily sleep time), and occupation-related characteristics.

The second part included the extended Nordic Musculoskeletal Questionnaire (NMQ-E), which consisted of 14 questions to investigate the prevalence of LBP [17]. NMQ-E is a scale commonly used for musculoskeletal pain and related conditions in studies conducted with workers as well as the general population. The NMQ-E probes whether there is aching, pain, or discomfort in nine different body regions until the date of survey, in the past 12 months, in the past 4 weeks, and on the day of the survey with yes/no questions. Since LBP is a chronic disorder of the musculoskeletal system, we evaluated its prevalence in the past 12 months in this study. The LBP was defined as pain, ache, or discomfort

located between the 12th thoracic vertebra and the gluteal fold that was bad enough to limit usual activities or change daily routine more than once day per month for the previous 12 months [18]. The Turkish validity and reliability study of the NMQ-E was performed by Kahraman et al. [19].

The third part included the Back Pain Functional Scale (BPFS), which was developed by Stanford et al. and consisted of 12 questions to evaluate the loss of function caused by LBP. In the BPFS, the functions that are considered to be impacted include work, school, home activities, habits, bending forward, wearing shoes or socks, lifting an object from the ground, sleeping, sitting, standing, walking, climbing stairs, and driving. Each item has a score between 0 and 5: (0) indicates that it is not possible to do the activity, (1) indicates it is extremely difficult, (2) indicates it is quite difficult, (3) indicates it is moderately difficult, (4) indicates it is somewhat difficult, (5) indicates it is not difficult. The minimum score is "0" points, the maximum score is "60" points, which indicates that none of the activities is difficult [20]. The Turkish validity and reliability study of the Functional Low Back Pain Scale was performed by Koç et al. [21].

2.3 Statistical analysis

The data were analyzed with the SPSS package program (version 21). The normality of the continuous data was evaluated with the Kolmogorov-Smirnov test and histogram graphs; their homogeneity was evaluated with Levene's test. The continuous data were presented as mean ± standard deviation (SD) if they had normal distribution and as median (min-max) otherwise. Categorical data were presented with frequency and percentage. Two-group comparisons in continuous data were performed with the independent-samples t-test or the Mann-Whitney U test, as appropriate. The comparisons of three or more groups for continuous data were performed with the Kruskal-Wallis H test since data did not have a normal distribution. Categorical variables were compared with the chi-square test, where post-hoc comparisons were performed by applying Bonferroni correction to the p-value. Demographic and occupational variables associated with LBP and a BPFS score of 44 or below were evaluated with binary logistic regression. Variables with a p-value of <0.25 in univariate analysis were included in the model, and the last remaining variables in the model were determined by the backward elimination (likelihood ratio) method. The fit of the model was tested with the Hosmer-Lemeshow test. All tests were bilateral, and an alpha-error = 0.05 was accepted.

3. Results

All taxi drivers participating in the study were males, with a mean age of 43.6 ± 11.9 years. Approximately half of the participants (49.7%) had LBP in the last year. Workers with LBP had a mean age higher than those without LBP (45.3±10.4 vs 41.9±12.9, p=0.002). The prevalence of LBP was significantly lower in those with a BMI (body mass index) between 18 and 24.9 kg/m^2, among singles (vs married) and in those who had at least one hour of physical activity per day in comparison to those who did not (Table 1).

When examining occupational characteristics (Table 2), the frequency of LBP was higher (61.9%) in subjects who worked ten years or more as taxi drivers compared to those who worked for less than ten years (p<0.001) and in those who worked more than 12 hours a day (54.4%) compared to those who worked less than 8 hours a day (p=0.025). A higher frequency of LBP was also observed in workers who lifted luggage or other items during work when compared to those who did not (p=0.031) and in those who did not use lumbar support on their seat compared to those who did (p=0.006). A lower frequency of LBP was found in the taxi drivers who had a weekly rest period of more than two days compared to those with no rest days (p=0.025) and in those who were satisfied with their jobs compared to those who were undecided about job satisfaction (p=0.026).

The factors associated with LBP were evaluated by multivariate logistic regression analysis. Variables with p<0.25 in univariate analysis and considered clinically significant were included in the model (age, BMI, marital status, education status, alcohol consumption, physical activity, total years of work, weekly rest period, lifting luggage during

Table 1. Prevalence of LBP stratified by demographic and personal characteristics.

Categories	All	LBP (n,%) Yes (222, 49.7%)	LBP (n,%) No (225, 50.3%)	p
BMI (kg/m^2)				
18-24.9	118	41 (34.7)	77 (65.3)	<0.001[2]
25-29.9	214	111 (51.9)	103 (48.1)	
≥30	115	70 (60.9)	45 (39.1)	
Marital status				
Single	127	48 (37.8)	79 (62.2)	0.002[2]
Married	320	174 (54.4)	146 (45.6)	
Education status				
Primary	203	107 (52.7)	96 (47.3)	0.240[2]
High school or higher	244	115 (47.1)	129 (52.9)	
Smoking				
No	214	109 (50.9)	105 (49.1)	0.607[2]
Yes	233	113 (48.5)	120 (51.5)	
Alcohol consumption				
No	233	108 (46.4)	125 (53.6)	0.144[2]
Yes	214	114 (53.3)	100 (46.7)	
At least 1 h/d of physicalactivity				
No	303	169 (55.8)	134(44.2)	
Yes	144	53 (36.8)	91 (63.2)	<0.001[1]
Daily sleep time				
<8 hours	298	152 (51)	146 (49)	0.422[1]
≥ 8 hours	149	70 (47)	79 (53)	

LBP: Low back pain, BMI: Body mass index.
[1]Independent samples t-test.
[2]Chi square test, with the letters indicating different groups.

work, lumbar support and job satisfaction). With the Backward Likelihood Ratio method, the last variables remaining in the model were determined and indicated in the tables. The final model included BMI, marital status, physical activity, total years of work, weekly rest period, lumbar support and job satisfaction.

In the multivariate adjusted model (Table 3), the risk of LBP was doubled in obese subjects, and in those who were undecided whether to be satisfied with the work. Increased risks of about 60% were found in overweight workers, married subjects, drivers who did not have physical activity and for those who had lumbar support on the seat. A threefold increased risk was found for subjects with longer duration of work (> 10 years) and in those with no weekly rest period.

In Table 4 BPFS scores of subjects with LBP are reported, stratifying by some pain characteristics. Lower BPFS score were associated to frequent and constant LBP, hospitalization for lowbackpain, temporary leave from work due to backpain, low back pain in the last 24 hours or last month, disruption of work at home and getting medical leave due to LBP.

The occupational characteristics and BPFS scores of the participants are described in Table 5.

Table 2. Prevalence of LBP stratified by occupational characteristics.

Categories	All	LBP (n,%)		P
		Yes (222)	No (225)	
Work schedule		**49.7%**	**50.3%**	
Daytime	176	86 (49.7)	90 (50.3)	0.675[1]
Nighttime	78	36 (46.2)	42 (53.8)	
Alternating daytime and nighttime	193	100 (51.8)	93 (48.2)	
Total years of work				
1-5 years	109	37 (33.9)	72 (66.1)	<0.001[1]
5-10 years	136	60 (44.1)	76 (55.9)	
>10 years	202	125 (61.9)	77 (38.1)	
Daily work hours				
<8 hours	96	36 (37.5)	60 (62.5)	0.025[1]
8-12 hours	215	112 (52.1)	103 (47.9)	
> 12 hours	136	74 (54.4)	62 (45.6)	
Weekly rest period				
>2 days	84	32 (38.1)	52 (61.9)	0.025[1]
2 days	109	51 (46.8)	58 (53.2)	
1 day	200	105 (52.5)	95 (47.5)	
None	54	34 (63)	20 (37)	
Lifting luggage during work				
Yes	343	180 (52.5)	163 (47.5)	0.031[1]
No	104	42 (40.4)	62 (59.6)	
Have lumbar support on the seat				
Yes	123	48 (39)	75 (61)	0.006[1]
No	324	174 (53.7)	150 (46.3)	
Job satisfaction				
Yes	265	119 (44.9)	146 (55.1)	0.026[1]
No	99	52 (52.5)	47 (47.5)	
Undecided	83	51 (61.4)	32 (38.6)	

LBP: Low back pain.
[1]Chi-square test, with the letters indicating different groups.

The scores were lower for those who did not have physical activity compared to those who had at least one hour of physical activity per day ($p<0.001$) and for those with less than 8 hours of sleep per day compared to those with more than 8 hours of sleep ($p=0.015$).

Lower scores were also observed for workers with less than two days of rest or no rest compared to those with more than two days of rest per week ($p=0.004$). A significant positive relationship was found between job satisfaction and BPFS scores ($p=0.020$). Total years of work, weekly work hours,

Table 3. Evaluation of the factors related to LBP by logistic regression analysis.

	Univariate LR			Multivariable LR*		
Categories	**OR**	**%95 Cl**	**P**	**OR**	**%95 Cl**	**P**
Age	1.03	1.01-1.04	**0.003**			
BMI (kg/m^2), Reference 18-24.9						
25-29.9	2.02	1.27-3.22	**0.003**	1.67	1.01-2.76	**0.045**
≥30	2.92	1.71-4.98	<**0.001**	2.15	1.19-3.87	**0.010**
Marital status, Reference Single						
Married	1.96	1.29-2.98	**0.002**	1.66	1.06-2.67	**0.040**
Education, Reference Primary						
≥High school	0.80	0.55-1.16	0.240			
Smoking, Reference No						
Yes	0.91	0.63-1.32	0.607			
Alcohol, Reference No						
Yes	1.32	0.91-1.91	0.144			
At least 1 h/d of physical activity, Reference Yes						
No	2.17	1.44-3.26	<**0.001**	1.66	1.06-2.62	**0.028**
Daily sleep time, Reference <8 hours						
≥ 8 hours	0.85	0.57-1.26	0.422			
Total years of work, Reference 1-5 years						
5-10 years	1.54	0.91-2.59	0.106	1.47	0.83-2.59	0.183
>10 years	3.16	1.94-5.14	<**0.001**	3.23	1.89-5.53	<**0.001**
Daily work hours, Reference <8 hours						
8-12 hours	1.81	1.11-2.97	**0.018**			
> 12 hours	1.99	1.17-3.9	**0.012**			
Work schedule, Reference Daytime						
Nighttime	0.89	0.53-1.53	0.690			
Alternating D and N	1.13	0.75-1.69	0.571			
Weekly rest period, Reference >2 days						
2 days	1.43	0.80-2.55	0.227	1.72	0.97-3.04	0.064
1 day	1.79	1.07-3.02	**0.027**	1.52	0.82-2.83	0.187
None	2.76	1.36-5.60	**0.005**	3.11	1.42-6.81	**0.005**
Lifting luggage during work, Reference No						
Yes	1.63	1.04-2.55	**0.032**			
Have lumbar support on the seat, Reference Yes						
No	1.81	1.19-2.77	**0.006**	1.67	1.05-2.66	**0.030**
Job satisfaction, Yes						
No	1.36	0.86-2.16	0.196	1.59	0.95-2.68	0.079
Undecided	1.96	1.18-3.24	**0.009**	2.07	1.17-3.66	**0.012**

*BMI: Body mass index, OR: Odss ratio, CI: Confidence interval, Ref: Reference for the analysis, *R^2: 0.205.*

Table 4. Pain characteristics and BPFS scores of the participants with LBP.

Categories	n (%)	BPFS score Median (min-max)	P
Frequency of LBP			
Rarely	97 (43.7)	48 (24-60)	<0.001[1]
Frequently	81 (36.5)	42 (5-59)	
Constantly	44 (19.8)	36 (13-56)	
Low back pain during non-work days			
Increases	8 (3.6)	44 (16-57)	0.537[1]
Decreases	149 (67.1)	44 (5-60)	
Does not change	65 (29.3)	43 (16-60)	
Hospitalization for low back pain			
Yes	23 (10.4)	39 (13-54)	0.002[2]
No	44.5 (89.6)	44 (5-60)	
Temporary leave from work/duty due to low back pain			
Yes	36 (16.2)	40 (15-56)	0.003[2]
No	186 (83.8)	44 (5-60)	
Low back pain in the last month			
Yes	169 (76.1)	43 (5-60)	0.019[2]
No	53 (23.9)	47 (11-60)	
Low back pain in the last 24 hours			
Yes	97 (43.7)	41 (13-57)	0.001[2]
No	125 (56.3)	47 (5-60)	
Disruption of work at home/outside due to low back pain in the last year			
Yes	77 (34.7)	37 (11-55)	<0.001[2]
No	145 (65.3)	47 (5-60)	
Getting a medical leave due to low back pain in the last year			
Yes	27 (12.2)	34 (5-52)	<0.001[2]
No	195 (87.8)	44 (11-60)	

LBP: Low back pain, BPFS: Back Pain Functional Scale.
[1]*Kruskal Wallis H test.*
[2]*Mann Whitney U test.*

work schedule, lifting luggage during work, and using lumbar support on the seat were note associated with BPFS scores.

According to the median value of the BPFS score of 44, the participants were divided into two groups: those who scored >44 points and those who scored ≤44. Using the Backward Likelihood Ratio method described above, the final variables remaining in the logistic regression model included physical activity, daily sleep time, daily work hours, job satisfaction remained and results are reported in Table 6.

The logistic regression analysis of occupational variables showed that the odds ratio of having a score of ≤44 was lower in those who slept 8 hours

Table 5. The comparison of the occupational characteristics with the BPFS scores of the participants.

Categories	BPFS score Median (min-max)	p
Have at least one hour of physical activity per day		
Yes	47 (5-60)	<0.001[2]
No	43 (11-60)	
Daily sleep time		
<8 hours	42 (5-60)	0.015[2]
≥ 8 hours	46.5 (20-60)	
Total years of work		
1-5 years	48 (15-58)	0.276[1]
5-10 years	42.5 (16-59)	
>10 years	44 (5-60)	
Daily work hours		
<8 hours	41 (11-60)	0.076[1]
8-12 hours	43 (5-59)	
>12 hours	46 (15-60)	
Work schedule		
Daytime	41 (11-60)	0.050[1]
Nighttime	42 (16-59)	
Alternating daytime and nighttime	46 (5-60)	
Weekly rest period		
>2 days	48 (24-60)	0.004[1]
2 days	47 (11-59)	
1 day	43 (5-60)	
None	39.5 (15-59)	
Lifting luggage during work		
Yes	44 (5-60)	0.268[2]
No	42 (17-58)	
Have lumbar support on the seat		
Yes	43 (22-57)	0.744[2]
No	44 (5-60)	
Job satisfaction		
Yes	45 (11-60)	0.020[1]
No	41 (5-59)	
Undecided	41 (16-55)	

BPFS: Back Pain Functional Scale.
[1]*Kruskal-Wallis H test.*
[2]*Mann-Whitney U test.*

Table 6. Occupational variables related to having a BPFS score of ≤44.

	Univariate LR			Multivariable LR*		
Variables	**OR**	**%95 Cl**	**P**	**OR**	**%95 Cl**	**P**
Age	1.00	0.98-1.03	0.793			
BMI (kg/m^2), Reference 18-24.9						
25-29.9	1.85	0.89-3.83	0.096			
≥30	1.99	0.91-4.37	0.083			
Marital status, Reference Single						
Married	0.82	0.43-1.57	0.548			
Education, Reference Primary						
High school or higher	0.77	0.45-1.29	0.321			
Smoking, Reference No						
Yes	1.48	0.87-2.52	0.145			
Alcohol, Reference No						
Yes	0.86	0.50-1.45	0.565			
At least 1 h/d of physical activity, Reference Yes						
No	2.21	1.18-4.15	**0.014**	2.10	1.08-4.08	**0.028**
Daily sleep time, Reference <8 hours						
≥ 8 hours	0.50	0.28-0.89	**0.019**	0.42	0.23-0.77	**0.005**
Total years of work, Reference 1-5 years						
5-10 years	1.60	0.70-3.66	0.262			
>10 years	1.78	0.85-3.74	0.126			
Daily work hours, Reference <8 hours						
8-12 hours	1.12	0.58-2.64	0.584	1.2	0.54-2.66	0.663
> 12 hours	0.64	0.29-1.44	0.242	0.53	0.23-1.25	0.146
Work schedule, Reference Daytime						
Nighttime	1.16	0.52-2.59	0.723			
Alternating daytime and nighttime	0.56	0.31-0.99	**0.049**			
Weekly rest period, Reference >2 days						
2 days	1.14	0.47-8.52	0.768			
1 day	1.65	0.74-3.66	0.219			
None	3.09	1.12-8.52	**0.030**			
Lifting luggage during work, Reference No						
Yes	1.145	0.73-2.89	0.286			
Have lumbar support on the seat, Reference Yes						
No	0.82	0.43-1.57	0.548			
Job satisfaction, Reference Yes						
No	1.48	0.77-2.86	0.240	1.77	0.88-3.55	0.108
Undecided	1.96	1.10-4.31	**0.026**	2.34	1.15-4.92	**0.019**

BMI: Body mass index, OR: Odss ratio, CI: Confidence interval, Ref: Reference for the analysis, R^2: 0.205.

or more per day compared to those who did not (OR=0.42, 95% CI 0.23-0.77). A higher OR was found in those who did not have at least one hour of physical activity per day compared to those who did (OR= 2.10, 95% CI 1.08-4.08) and in those who were undecided about their job satisfaction compared to those who were satisfied with their job (OR= 2.34, 95% CI 1.15-4.92).

4. Discussion

In this study, the one-year prevalence of LBP was found to be 49.7% among taxi drivers working in the city of Izmir, Turkey. Although the overall prevalence of LBP among taxi drivers in Turkey is not known, the result of our study was similar to those in studies conducted among taxi drivers in China (54%), Malaysia (48.5%), and Taiwan (51%) [8-10]. In addition, the prevalence of LBP and the BPFS scores were found to be related to demographic, individual, and occupational factors.

In our study, the frequency of LBP increased with age among taxi drivers, consistent with a study on bus-drivers [22]. According to the Turkish Nutrition and Health Survey, 37.3% and 13.2% of men in Turkey were overweight and obese, respectively [23]. However, about half of the taxi drivers in our study were overweight, and 25% were obese. Men constitute a majority of the workforce in the transportation sector, and in a study conducted in San Francisco (California, USA), the rate of overweight and obesity in drivers was found to be 78.5% [24]. About one-third of the taxi drivers were found to exercise, and LBP was more common among those who did not do physical exercise. Since most of the taxi drivers sit for long periods and work alternating shifts, their opportunities for exercise may be limited. Despite the risk of injury from physical activity, studies demonstrated an association between physical activity and a lower risk of musculoskeletal problems [25]. Consistent with our study, other studies conducted among taxi drivers have found that the frequency of LBP was higher among those who did not engage in physical activity [8, 26]. In addition, the BPFS scores were found to be lower among taxi drivers who had LBP and did not have physical activity.

Several physical factors linked to the working environment of urban taxi drivers may explain the observed relationship between the prevalence of LBP and long-term driving. Biomechanical studies have shown that driving activities in cars can cause postural stress in the lumbar spine and that the limited sitting space in taxis may also put taxi drivers at greater risk for LBP [27]. Sitting behind the wheel for a long time has a cumulative effect on low back muscle fatigue and causes significant postural strain in the lumbar spine [28]. In addition, like other professional drivers, taxi drivers are exposed to whole-body vibration on a regular basis. Chen et al. have recently demonstrated that urban taxi drivers are regularly exposed to lower levels of whole-body vibration [29]. Lis et al. reported that sitting alone does not increase the risk of LBP, but exposure to whole-body vibration or sitting for more than half a working day with an abnormal posture increases the risk; however, they also reported that the combination of these factors led to the greatest increase in the risk of LBP [30]. In our study, a strong correlation was found between the total years of work as a taxi driver and the frequency of LBP. Consistent with our findings, previous studies demonstrated a significant correlation between the total work time and the risk of LBP in taxi drivers [9, 26, 31].

There is a significant relationship between long working hours and LBP in drivers [9, 10, 32]. Porter and Gyi found that driving for more than 20 hours a week as an occupation was associated with lower back problems and absenteeism due to these problems [33]. Our bivariate analysis demonstrated a significant relationship between daily work hours and LBP; however, the multivariate logistic analysis failed to confirm this association. In addition, perpetual work without a weekly rest day was found to be a risk factor for LBP among taxi drivers.

A cross-sectional epidemiological study by Chen et al. showed that there was a significant relationship between LBP and the seat inclination or use of lumbar support (16). Harrison et al. suggested that, to reduce LBP, the appropriate driver's seat should have shock absorbers that can reduce the whole-body vibration frequency in the range of 1-20 Hz and a backrest, seat cushion, lumbar support, armrests, and headrest that can be adjusted according to the

individual needs of the drivers [34]. In our study, about three-quarters of the taxi drivers did not have lumbar support in their seats, and they had a higher prevalence of LBP. A strong association was found between LBP and not having lumbar support in the driver's seat. Several epidemiological studies have shown that sitting for long periods of time in uncomfortable seats that have no lumbar or back support and allow inappropriate postures would cause increased postural stress, which in turn would lead to musculoskeletal problems such as LBP [16, 35].

Monotonous work, high perceived workload, time pressure, low control on the job, and lack of social support from colleagues were suggested to be associated with musculoskeletal disorders, including LBP [36]. Chen et al. observed a high prevalence of LBP among taxi drivers with self-assessed high job stress or job dissatisfaction [10]. Similarly, our study found that being undecided about job satisfaction was a risk factor for LBP and low BPFS scores among taxi drivers.

This was the first study to investigate the frequency of LBP among taxi drivers in Turkey. As a cross-sectional study based on self-reported data, the study had several limitations. Due to possible recall bias, it is possible that the participants were miscategorized based on the LBP experienced in the last year. In addition, similar to those in other cross-sectional studies, participants with LBP may be more likely to over-report work-related factors. Finally, a causal relationship between work-related factors and LBP could not be established due to the cross-sectional nature of our study. However, the results of this study are very important in terms of guiding the planning in future preventive and intervention measures for the working conditions of taxi drivers.

5. Conclusions

In this study, the prevalence of low back pain among taxi drivers working in Izmir, Turkey, was 49.7%. A strong relationship was found between the frequency of low back pain and physical activity, total years of work, rest periods, job satisfaction, and having a seat with lumbar support. Early detection and management of low back pain are important to avoid related morbidities and disabilities among taxi drivers. Increasing drivers' awareness about proper ergonomics and healthy lifestyles may help reduce the risk of low back pain. We believe that the results of this study will guide future studies investigating the relationship between occupational factors and low back pain.

Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Ethics Committee of the University of University of Health Sciences, Bozyaka Training and Research Hospital (2021/44).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Conflict of Interest: No conflict of interest was declared by the authors.

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