Khadour et al. BMC Musculoskeletal Disorders (2024) 25:687
https://doi.org/10.1186/s12891-024-07828-w

BMC Musculoskeletal Disorders

RESEARCH

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Risk factors Associated with Pain Severity in Syrian patients with non-specific low back Pain

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Abstract

Background Low back pain (LBP) majorly contributes to activity limitations and work absences worldwide. Therefore, a comprehensive knowledge of the risk factors linked to non-specific low back pain (NSLBP) can enable early and timely interventions to achieve long-term improvements. Current study aimed to assess the risk factors associated with the severity of NSLBP patients in Syria.

Methods This study used a cross-sectional design and a self-assessment questionnaire to collect data on NSLBP, as well as personal and physical factors, across four provinces in Syria (Damascus, Aleppo, Homs, and Latakia) from November 2021 to September 2022. The assessments incorporated the Short Form 36-Item Health Survey (SF-36), the Visual Analogue Scale (VAS) and Oswestry Disability Index (ODI). Then we examined the relationship between the severity of NSLBP and these potential risk factors. Descriptive statistics were employed to summarize the demographic characteristics of the participants. Additionally, multiple logistic regression analysis was performed to evaluate the risk factors for non-specific low back pain.

Results The study included a total of 875 patients with NSLBP. The results indicated that patients with primary school education, a high body mass index (BMI), prolonged driving and sitting durations, smoking habits, and recurrent low back pain had higher VAS and ODI scores, as well as lower SF-36 scores ($p < 0.01$). Additionally, workers and drivers had higher VAS and ODI scores and lower SF-36 scores compared to waiters and patients who lifted objects heavier than 10 kg for more than a quarter of their work time for over 10 years ($p < 0.01$). The multiple logistic regression analysis revealed that lower education levels, low back pain lasting 1–7 days, chronic low back pain in the past year, smoking, driving for prolonged time, and higher BMI were associated with more severe VAS scores.

Conclusion The severity of NSLBP is related to lower education levels, poor living conditions, strenuous physical labor, inactive lifestyle, and driving for a long time. Additionally, patients with recurrent NSLBP experience more intense pain. To manage these issues, potential interventions could include reducing obesity rates, limiting the

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duration of hard physical work, limiting driving duration and reducing sedentary behaviors and smoking. These measures may help alleviate the overall burden of NSLBP.

Keywords Low back pain, Risk factors, Visual Analogue Scale, Medical outcomes study, Short form 36-Item Health Survey, Syria.

Introduction

Low back pain (LBP) is a common and widespread condition globally and a key cause of restricted activity and work commitment and its prevalence of LBP could be as high as 83%, with current prevalence rates between 19% and 39% [1]. This condition represents substantial cost on both individuals and governments [1]. Non-specific low back pain (NSLBP), which refers to LBP without specific underlying pathologies such as tumors, fractures, or inflammation, make up more than 85% of all LBP cases [2]. Understanding the contributing risks associated with NSLBP is essential for applying prompt and effective strategies with persistent outcomes. Various risk factors contribute to LBP, including individual factors such as gender, age, habits, physical ability, and body mass [3], psycho-social factors like stress, life satisfaction level, community services provided, and work condition [4–6] as well as physical factors like demanding physical effort, heavy objects holding, and repetitive, stressful movements demand to bending forward or rotation [7]. Kwon et al. demonstrated that the regression of LBP condition was not solely linked to behavioral and psychosocial factors [7]. Previous reviews have also suggested that prolonged positions and heavy objects holding [8–12] may not be direct and primary causes of LBP, and the role of these risk factors remains under study up till now. Moreover, previous conducted research often did not rule out certain pathologies (e.g., infection, tumor, osteoporosis, fractures, structural deformities, inflammatory disorders, and radicular pain), which could affect the results [13]. Although numerous experimental studies have discovered the factors that cause to LBP, the findings need to be more consistent, with only a limited number of studies explicitly focusing on NSLBP [2]. Therefore, this study's objective was to identify further the risk factors associated with heightened NSLBP, specifically among the Syrian population.

Methods

Design and subjects

This cross-sectional study used a self-report questionnaire (paper version) to collect informative data about NSLBP and its individual and physical aspects across eight orthopedic and rehabilitation centers in four provinces in Syria (Damascus, Aleppo, Homs, and Latakia), two centers were selected from each province. This study included patients with LBP who had visited these centers between November 2021 to September 2022. The patients whose leading complaint was LBP for >1 week, those who agreed to undergo magnetic resonance imaging (MRI) examination, and those with occupations involving physical labor and office work, including restaurant waiters and drivers, were included in the present study. The MRI examination was performed for all the enrolled NSLBP patients to eliminate the presence of specific spine pathologies such as a tumor, fracture, and inflammation. Individuals aged < 18 years or >65 years and with mental disorders and a history of cancer or severe chronic physical disorders (e.g., hypertension, diabetes, coronary heart disease, chronic kidney disease, bronchitis, and asthma) were excluded from the study. Participants with LBP that was attributed to spine fractures, spine inflammation, spinal tumor, spinal tuberculosis, lumbar disc herniation, spinal stenosis, spondylolisthesis, aneurysm, or lithiasis were also excluded.

Data collection was carried out using a pretested, self-administered, structured questionnaire, where a pilot study of the used questionnaire was performed among 25 patients (13 males and 12 females) who were interviewed afterward to evaluate their understanding of the questionnaire items and was an additional quality measure of the final product. The committee performed minor adjustments according to the comments of the 25 participants. The comments that came from the patients were about the item "Duration of LBP in last year (day)" and item "Duration of current LBP (day)." The choices of these items required some explanations, so some sentences were added beside each option to make the meaning clear and easy for the participants to understand. The survey included demographic data, gender, age, weight, height, smoking and drinking, marital status, previous LBP in the last year, duration of the previous LBP episode, seeking medical advice for pain, LBP treatment in the last year, current work, prior hard physical labor, driving or riding duration, exercise practising, sitting or standing duration. LBP severity and quality of life were assessed using validated measures, including the Visual Analogue Scale (VAS), 36-Item Short Form Health Survey (SF-36), and the Oswestry Disability Index (ODI). The VAS is a widely used, simple, and reliable tool for measuring the intensity of pain, where patients rate their pain on a scale from 0 (no pain) to 10 (worst possible pain) [14]. The SF-36 is a comprehensive health-related quality-of-life questionnaire that evaluates eight domains: physical functioning, role-physical, bodily pain, general health, vitality, social functioning, role-emotional, and mental health [15]. The ODI is a self-reported measure of disability for low back pain, consisting of 10 items that assess the impact of low back pain on various daily activities [16]. All participants who met the inclusion criteria and voluntarily participated in the study provided written consent after fully understanding the terms and conditions.

This study was reviewed and approved by the Neijiang Normal University Institutional Review Board Consent Letter NUU – IRB 202,405,126 (Clinical Trial Number NUU-0002024123 A). All procedures were conducted under the ethical principles outlined in the 1964 Declaration of Helsinki and Strengthening the Reporting of Observational Studies in Epidemiology Using Mendelian Randomization (STROBE) statements, and all our methods were carried out under relevant guidelines and regulations. Informed consent was obtained from all the participants and their legal guardian(s).

Sample size estimation

To calculate the prevalence of chronic low back pain, we employed a sample size calculation considering a desired confidence level of 95% and a margin of error of 5%. Given the lack of information on the prevalence, we assumed a maximum variability of 50%. Initially, a sample size of 567 was determined based on these parameters. To account for potential contingencies such as nonresponse, the sample size was increased by 10%. Additionally, we factored in the design effect (D) of 1.5 by multiplying the sample size accordingly. Consequently, the final estimated sample size for the study was 800 participants.

Statistical analysis

Numerical variables were summarized using the mean and standard deviation. Initially, a simple descriptive analysis was conducted, and comparisons between respondents were made using the Student t-test for numerical variables and the chi-square test or simple logistic regression model for categorical variables. Factors that showed a significant association ($p<0.05$) with LBP in the bivariate analysis were further analyzed using multiple logistic regression analysis. Odds ratios (ORs) were calculated to determine the relative odds of experiencing LBP about the presence of a specific factor.

Results

Demographic characteristics

A total of 875 patients with non-specific low back pain (NSLBP) were included in the study, conducted between November 2021 and September 2022. The study population consisted of 476 males and 399 females, with a mean age of 41.43±12.38 years (range: 18–65 years). Anthropometric measurements showed a mean height of 162±13 cm, mean weight of 61.73±12.82 kg, and mean BMI of 23.72±5.82 kg/m2. The severity of low back pain, disability, and quality of life were assessed using the Visual Analog Scale (VAS), Oswestry Disability Index (ODI), and SF-36 questionnaire, respectively. The mean scores were 4.21±1.72 for VAS, 36.41±16.89 for ODI, and 67.45±21.86 for the overall SF-36 (Table 1).

Risk factors associated with low back pain in bivariate analyses

The demographic factors investigated, including age and gender, did not exhibit a statistically significant association with NSLBP ($p=0.28$). Nonetheless, there was an observed correlation between education level and the severity of LBP. Individuals with a primary school education reported experiencing more severe LBP compared to those with secondary or university education ($p=0.004$). Patients with a secondary-level education exhibited higher levels of low back pain compared to those with university-level education; however, this difference did not reach statistical significance ($p=0.57$) (Table 2). The analysis of the impact of occupation on LBP included four distinct career categories. The findings revealed a significant difference in pain intensity between the physical workers and waiters groups, as well as between the drivers and waiters groups ($p=0.03$). Specifically, the waiters group demonstrated the lowest severity of LBP as measured by the Visual Analog Scale (VAS) score, while the heavy workers exhibited the highest score (Table 2). Elevated (BMI) was correlated with increased severity of LBP, reflected by a higher (VAS) score ($p=0.02$), higher ODI score, and lower SF-36 life quality score (Table 2).

Individuals who consistently lifted items weighing over 10 kg for at least 25% of their total work hours for more than a decade had more severe lower back pain compared to those who didn't lift heavy weights ($p=0.016$). They also exhibited elevated ODI scores ($p=0.024$) and lower SF-36 scores ($p=0.015$). Extended periods of driving were linked to higher LBP VAS scores ($p=0.0267$), increased ODI scores ($p=0.024$), and reduced SF-36 scores (Table 3). Patients who spent over 8 h per day sitting had a higher LBP VAS score ($p=0.042$), elevated ODI score ($p=0.473$), and lower SF-36 score ($p=0.267$) (refer to Table 3). Conversely, patients who stood for more than 8 h daily had a lower LBP VAS score ($p=0.436$), decreased ODI score ($p=0.781$), and higher SF-36 score ($p=0.078$), although these differences were not statistically significant (Table 3).

Regular exercise was linked to an improved quality of life but did not show a significant impact on reducing pain. Patients who engaged in regular exercise had similar VAS scores ($p=0.471$), and ODI scores ($p=0.501$), but they exhibited higher SF-36 scores ($p=0.007$) (Table 3). Smokers experienced more severe LBP compared

Table 1 Demographic characteristics ($N=875$)

Cha Characteristic r	Sub-group	Gender			χ 2	p-value
		Male	Female	Total		
No. of patients		476 (59.4)	399(40.6)	875		0.207
Age (yr)		41.75 ± 11.39	43.84 ± 12.41	41.43 ± 12.38		0.286
Height (m)		1.63 ± 0.16	1.57 ± 0.15	1.62 ± 13.12		0.312
Weight (kg)		68.34 ± 12.25	61.75 ± 10.97	61.73 ± 12.82		0.229
Body mass index (kg/m^2)		24.75 ± 5.74	24.37 ± 5.48	23.72 ± 5.82	3.02	0.221
	Normal	248 (59.7)	210 (52.6)	458		
	Overweight	126 (26.5)	107 (26.8)	233		
	Obese	102 (21.4)	82 (45.6)	184	12.84	< 0.01
Smoking	Yes	224 (47.1)	103 (25.8)	327		
	No	252 (52.9)	296 (74.2)	548	30.7	< 0.01
Drinking	Yes	84 (17.6)	73 (18.3)	157		
	No	392 (28.4)	326 (81.7)	718	0.299	0.861
Education level	Primary school	152 (31.9)	116 (29.1)	268		
	Middle school	227 (47.7)	198 (49.6)	425		
	University	97 (20.4)	85 (21.3)	182	1.38	0.501
Duration of current LBP (day)	1–7	133 (27.9)	124 (31.1)	257		
	8–30	234 (49.2)	154 (38.6)	388		
	> 30	109 (22.9)	121 (30.3)	230	2.32	0.130
LBP last year	Yes	236 (49.9)	152 (38.1)	385		
	No	243 (51.1)	247 (61.9)	490	21.8	< 0.01
Duration of LBP in last year (day)	1–7	148 (31.1)	108 (27.1)	256		
	8–30	201 (42.2)	159 (39.8)	360		
	> 30	127 (26.7)	132 (33.1)	259	0.003	> 0.05
Pain consultation in last year	Yes	149 (31.3)	135 (33.8)	284		
	No	327 (68.7)	264 (66.2)	591	271.3	< 0.01
Occupation	Heavy worker	191 (40.1)	48 (12.1)	239		
	Office staff	163 (34.2)	264 (66.1)	427		
	Waiter	48 (10.1)	85 (21.3)	133		
	Driver	74 (15.6)	2 (0.5)	76	76.6	< 0.01
Heavy physical labor during work	Yes	43 (9.1)	5 (1.2)	48		
	No	433 (90.9)	394 (98.8)	827	15.4	< 0.01
Long time driving or taking bus/subway (more than 2 h per day)	Yes	137 (28.8)	35 (8.8)	172		
	No	309 (71.2)	334 (91.2)	703	0.37	0.590
Regular exercise	Yes	104 (21.8)	59 (14.8)	163		
	No	372 (78.2)	340 (85.2)	712	21.8	< 0.01
Long time sitting (more than 4 h per day)	Yes	184 (38.6)	143 (35.8)	327		
	No	292 (61.4)	256 (64.2)	548	109.6	< 0.01
Long time standing (more than 3 h per day)	Yes	53 (11.2)	136 (34.1)	189		
	No	423 (88.8)	263 (65.9)	686		0.458
Visual Analogue Scale score		4.38 ± 1.69	4.42 ± 1.74	4.21 ± 1.72		0.296
Oswestry Disability Index score		40.21 ± 18.37	39.47 ± 18.51	36.41 ± 16.89		0.160
36-Item Short Form Health Survey score	Physical component score	61.35 ± 21.77	63.69 ± 26.24	67.45 ± 21.86		> 0.05
	Physical function	67.25 ± 20.48	68.49 ± 22.12	67.43 ± 18.43		
	Role-physical	53.28 ± 28.36	54.75 ± 31.27	53.87 ± 32.78		
	Body pain	58.48 ± 18.64	56.53 ± 21.83	62.67 ± 23.34		
	General health	64.59 ± 20.52	63.37 ± 22.03	64.83 ± 21.62		
	Vitality	66.78 ± 21.37	67.18 ± 21.93	66.24 ± 20.65		
	Social functioning	65.73 ± 26.12	66.59 ± 27.72	65.78 ± 17.38		
	Role-emotional	62.34 ± 43.52	68.14 ± 45.34	59.48 ± 32.87		
	Mental health	64.34 ± 16.83	67.47 ± 20.67	64.98 ± 21.58		

Values are presented as number (%) or mean ± standard deviation

Table 2 Risk factors associated with non-specific low back pain

ChaCharacteristic	Sub-group		Visual Analogue Scale score		Oswestry Disability Index score		36-Item Short Form Health Survey score	
		No.	Score	p-value	Score	p-value	Score	p-value
Education level	Primary school (I)	152	4.79 ± 1.53	0.004	38.92 ± 17.84	< 0.01	55.08 ± 20.54	0.004
	Middle school (II)	227	4.49 ± 1.59*		37.58 ± 15.38*		62.74 ± 22.64*	
	University (III)	97	4.28 ± 1.49#		34.73 ± 16.39#		65.96 ± 18.39#	
Occupation	Heavy worker (I)	191	4.68 ± 1.59	0.03	43.79 ± 17.59	0.04	64.25 ± 19.86.18	0.01
	Office staff (II)	163	4.18 ± 1.59		38.73 ± 18.67*		65.98 ± 20.53*	
	Waiter (III)	48	3.89 ± 1.69#		33.96 ± 18.63#		68.64 ± 24.74#	
	Driver (IV)	74	4.47 ± 1.81+,^		41.73 ± 17.48$,+		61.42 ± 19.31$,+	
Body mass index	Normal (I)	248	4.46 ± 1.69	0.02	37.95 ± 18.05	0.04	63.64 ± 18.86	0.03
	Overweight (II)	126	4.72 ± 1.38*		41.67 ± 16.94*		57.56 ± 16.37*	
	Obese (III)	102	4.89 ± 1.83#,&		44.69 ± 22.75#		53.86 ± 19.63#	
Duration of low back pain in last year	1–7 Days (I)	148	4.59 ± 1.49	0.034	33.75 ± 18.08	0.026	58.95 ± 16.95	0.021
	8–30 Days (II)	201	4.94 ± 1.55*		41.37 ± 17.85		55.95 ± 19.63*	
	> 30 Days (III)	127	5.37 ± 1.82#&		45.74 ± 20.85&		52.64 ± 17.30#,&	

Values are presented as mean ± standard deviation. *

Table 3 Risk factors associated with non-specific low back pain

Characteristic	Sub-group (cases)	Visual Analogue Scale score			Oswestry Disability Index score			36-Item Short Form Health Survey score		
		Score	t-value	p-value	Score	t-value	p-value	Score	t-value	p-value
Smoking	Yes	6.21 ± 1.77	4.94	0.03	51.45 ± 16.47	4.1	0.012	62.34 ± 20.13	4.1	0.042
	No	5.24 ± 1.56			41.26 ± 16.12			63.97 ± 21.05		
Regular exercise	Yes	5.13 ± 1.83	2.04	0.471	42.53 ± 22.11	1.4	0.501	68.46 ± 31.53	4.5	0.007
	No	6.01 ± 2.15			39.47 ± 19.28			62.15 ± 21.64		
Heavy physical labor during work	Yes	5.21 ± 1.93	3.14	0.016	48.48 ± 18.03	4.1	0.024	55.34 ± 19.11	3.6	0.015
	No	4.67 ± 1.52			41.27 ± 16.41			61.65 ± 21.15		
Sitting duration (more than 4 h per day)	Yes	4.87 ± 1.73	2.1	0.042	42.45 ± 19.17	2.1	0.473	59.58 ± 19.43	4.2	0.267
	No	4.37 ± 1.47			34.36 ± 1583			63.37 ± 20.72		
Standing duration (more than 3 h per day)	Yes	3.89 ± 1.21	1.3	0.436	42.67 ± 16.17	0.31	0.781	61.65 ± 22.14	1.4	0.078
	No	4.24 ± 1.56			36.62 ± 14.72			63.12 ± 16.52		
Long duration driving or taking bus/subway (more than 2 h per day)	Yes	4.42 ± 1.58	1.7	0.0267	44.67 ± 20.21	1.5	0.024	59.42 ± 19.43	1.36	0.267
	No	4.74 ± 1.72			40.14 ± 17.37			61.54 ± 20.15		
Recurrent LBP	Yes	3.92 ± 1.35	5.2	0.041	38.45 ± 17.64	3.67	0.032	62.57 ± 17.56	3.6	0.013
	No	4.24 ± 1.58			33.16 ± 16.33			59.67 ± 15.89		

Values are presented as mean ± standard deviation

Represents there is statistical difference between the groups I and II. #

Represents there is statistical difference between the groups I and III. &

Represents there is statistical difference between the groups II and III. $

Represents there is statistical difference between the groups I and IV. +

Represents there is statistical difference between the groups II and IV. ^

Represents there is statistical difference between the groups III and IV.!

to non-smokers, as evidenced by higher VAS scores ($p=0.03$), elevated ODI scores ($p=0.012$), and lower SF-36 scores ($p=0.042$) (Table 3). Patients experiencing recurrent LBP had elevated VAS scores ($p=0.041$), increased ODI scores ($p=0.032$), and lower SF-36 scores ($p=0.013$), compared to those with new-onset LBP (see Table 3). Moreover, the severity of present LBP increased with the duration of the last LBP episode, as evidenced by higher VAS scores ($p=0.034$), elevated ODI scores

($p=0.026$), and lower SF-36 scores ($p=0.021$) (refer to Table 2).

The results of the multiple logistic regression

In the multiple logistic regression models, all predictor variables remained significant even after adjusting for age, gender, and other factors. Lower education levels, shorter duration of current LBP (1–7 days), longer duration of LBP in the past year, smoking, longer duration of driving, and higher BMI scores was correlated with more severe non-specific lower back pain, as indicated by the VAS score. Specifically, primary school education, compared to middle school, had an odds ratio (OR) of 1.661 (95% confidence interval [CI], 1.702–2.963), and primary school education, compared to university, had an OR of 3.371 (95% CI, 1.831–4.951). Similarly, a current LBP duration of 1–7 days had an OR of 1.362 (95% CI, 1.185–3.841) compared to a duration of 8–30 days, and a current LBP duration of 1–7 days had an OR of 1.741 (95% CI, 1.521–4.521) compared to a duration of more than 30 days. A last-year LBP duration of 0 days had an OR of 2.152 (95% CI, 1.531–3.146) compared to a duration of 8–30 days, and a last-year LBP duration of 0 days had an OR of 3.721 (95% CI, 2.721–5.838) compared to a duration of more than 30 days. Being a heavy worker had an OR of 1.379 (95% CI, 0.511–2.842) compared to being a waiter (Table 4).

Discussion

Principle factors

The study conducted on Syrian patients with NSLBP aimed to detect factors that responsible for increasing pain intensity. According to our findings Various risk factors were linked to increase NSLBP pain including smoking, higher BMI, strenuous physical work extended sitting, prior experience of LBP and prolonged driving. Age was as a significant factor for LBP, with the symptoms typically occurring around age of 30. The frequency of low back pain typically rises with age until approximately 60–65 years old, after which it gradually decreases. Our work specifically focused on individuals aged 31–55 years with NSLBP, excluding individuals over the age of 65 due to the presence of multiple comorbidities and spinal stenosis, which could potentially affect the results.

Non-specific low back pain risk factors

Smoking among adults consistently correlates with low back pain (LBP), increasing the likelihood of experiencing LBP in a manner dependent on the amount smoked [17, 18]. Daily smoking of over nine cigarettes is connected to sustained LBP [17]. However, both individuals currently smoking and those who have ever smoked demonstrate a higher occurrence of LBP in contrast to individuals have never smoked before [19]. Research using computational modeling indicated that smoking plays a role in the degeneration of intervertebral discs in the of the Intervertebral Disc [20]. Although Landry et al. discovered no notable correlation between tobacco use and LBP [21], our study revealed that individuals who smoke (≥10 cigarettes/day) experience more severe NSLBP than non-smokers. Additionally, smokers exhibit higher scores on both the VAS and the ODI, along with lower scores on the SF-36 questionnaire.

Concerning alcohol consumption, it has been proposed that the uncoordinated movements induced by alcohol could compromise the stability of the spine, rendering it more susceptible to injuries. Heavy alcohol consumption is also linked to social and psychological issues that could influence the onset of chronic LBP. While previous study demonstrates there is a high association between LBP individuals who consume alcohol, either currently or in the past [22], other studies have not found a identifiable association between alcohol consumption and

Table 4 Adjusted association between non-specific low back pain and independent variables in the multiple logistic regression models

Characteristic	Regression coefficients	Standard error	*p*-value	OR (95% confidence interval)
Primary school vs. middle school	0.8536	0.3512	< 0.0001	1.661 (1.702–2.963)
Primary school vs. university	1.2691	0.3914	< 0.0001	3.371 (1.831–4.951)
Current LBP for 1–7 vs. 8–30 day	0.7412	0.2641	< 0.0001	1.362 (1.185–3.841)
Current LBP 1–7 vs. >30 day	0.5801	0.1268	< 0.0001	1.741 (1.521–4.251)
Last year LBP 0 vs. 1–7 day	0.6251	0.3267	0.1316	1.511 (0.621–2.781)
Last year LBP 0 vs. 8–30 day	0.8317	0.4278	0.0058	2.152 (1.531–3.146)
Last year LBP 0 vs. >30 day	0.8417	0.3691	0.0021	3.721 (2.731–5.838)
Heavy worker vs. office staff	-0.1573	0.2531	0.9422	0.429 (0.278–1.145)
Heavy worker vs. waiter	0.5782	0.4829	0.0494	1.379 (0.511–2.482)
Heavy worker vs. driver	0.8530	0.7422	0.1742	1.942 (1.142–3.431)
Long time driving or taking a bus/subway	0.8643	0.3941	0.0381	1.946 (1.483–3.591)
Smoking	1.2818	0.4931	0.0295	1.159 (1.038–3.205)

LBP, low back pain

LBP, excluding individuals with alcohol addiction [23]. In our study, there was no notable connection observed between alcohol intake and the severity of NSLBP.

Research findings have consistently demonstrated that obesity or having a high BMI greater than 30 kg/ m^2 is linked to a greater occurrence of LBP [24–26]. People who are obese have a higher likelihood of LBP compared to those with a normal weight, and a high BMI is strongly associated with a greater occurrence of LBP [27]. This could be explained by the increased physical strain during movement and changes in posture resulting from the higher body weight. In our study, we noticed that individuals with a greater BMI reported experiencing more intense pain compared to those with normal weight who had NSLBP.

Current national and international guidelines widely advocate exercise as a treatment for chronic LBP. A prior study discovered that participating in regular sports activities was linked to a decreased prevalence of LBP and provided advantages for both primary and secondary prevention of LBP [28]. Exercises can enhance muscle coordination in the spine, which is advantageous for addressing LBP. Additionally, lumbar stabilization exercises have demonstrated greater efficacy than conservative treatments in enhancing functional disability and lumbar lordosis. Macedo et al. illustrated that motor control exercises did not yield significant benefits for acute and sub-acute LBP [29]. On the contrary, involvement in sports activities may deteriorate LBP [30]. On the contrary, involvement in sports activities may deteriorate LBP [30], we investigated in our research the effect of general exercise on the severity of NSLBP, and the findings revealed that patients who regularly participated in exercise did not report reduction in pain intensity. It's crucial to consider that multiple factors can affect these outcomes, including the type of sports activity and the volume and intensity of exercises.

Exposure to whole-body mechanical vibration is now widely acknowledged as a primary contributor to musculoskeletal disorders among occupational drivers, particularly in the spinal system. Drivers commonly report experiencing LBP, with those suffering from LBP demonstrating significantly higher total driving distances [31]. This correlation can be attributed to the fatigue experienced by the back muscles during exposure to vehicle vibration, making them more prone to experiencing pain. However, previous studies did not find a clear relationship between driving duration of daily work spent working and the occurrence of LBP [32]. Our study observed that a longer duration of driving or traveling was associated with increased pain intensity in LBP, higher scores on the ODI, and lower scores on the SF-36, which measures health-related quality of life. However, these differences did not reach statistical significance. One possible explanation for this finding is that individuals who use public transportation, such as the subway, do not experience the same level of vibration during their travels.

Several studies have explored the link between manual labor involving lifting and lower back pain [11, 33]. However, the results have been varied, likely due to differences in lifting regularity, duration, and intensity. It has been illustrated that the intensity and regularity of lifting tasks can accurately expect LBP, following a dose-response pattern. Moreover, the quantity of lifts involving objects weighing 20 kg or more during an 8-hour workday has been recognized as a notable risk factor for LBP [33]. However, varying results have been reported in other studies; some have found no evidence linking lifting to the occurrence of LBP [11]. current study discovered that individuals who frequently lifted objects weighing over 10 kg for at least one-quarter of their work time over more than 10 years reported more severe LBP compared to those who did not engage in heavy lifting.

Modern lifestyle has resulted in an increase in sedentary behavior, which is associated with obesity and, consequently, chronic health issues. Extended periods of sitting have been associated with heightened stress on intervertebral discs, compromised structures in the posterior lumbar region, and reduced metabolic processes [34]. Previous research indicated that Extended periods of sitting is a risk factor for LBP [8]. However, the results of the present study do not align with the idea that extended sitting at work or during free time is linked to LBP [35, 36]. Here, our findings demonstrate that patients who sit for more than 8 h daily experience more severe NSLBP.

Additionally, individuals with lower educational attainment have a higher occurrence of LBP [37]. Specially, individuals with lower education levels have approximately four times more likely to experience LBP [38]. This correlation may be due to exhausting work postures and frequent heavy lifting. Low educational status is associated with multiple diseases, including muscular disorders and LBP [39]. Educational can affect the occurrence and persistence of LBP through lifestyle factors like smoking and obesity [40]. The results of our study indicate that patients with only primary school education experience higher levels of NSLBP compared to those who have completed secondary or university-level education. LBP frequently occurs, from 25 to 80% within a year [41]. In our study, we assessed pain intensity in both primary and recurrent NSLBP. The findings showed that patients with recurrent NSLBP had higher scores on the VAS and ODI. indicating greater pain intensity and functional impairment, respectively. We investigated the correlation between the duration of NSLBP experienced in the past year and the current pain intensity of NSLBP. The findings indicated that the severity of current

NSLBP increases with the prolonged duration of previous NSLBP, as evidenced by higher VAS and ODI scores, and a lower SF-36 score.

The present study has notable strengths, including a large sample and the involvement of medical experts in distributing and assisting patients with the questionnaire. A standardized definition of NSLBP was utilized, and careful consideration of MRI scans and medical history helped exclude patients with organic diseases like spinal tumors and inflammatory conditions. However, it is crucial to acknowledge several limitations of the current work. The accuracy and completeness of the data relied on self-reported questionnaires, which may introduce potential bias and impact the study's internal validity. Additionally, certain unmeasured variables, such as the social economic status of patients, that could be related to low back pain, needed to be accounted for, potentially influencing the results. As well as, since this study is an observational association study, meaning that a causal relationship cannot be inferred.

Conclusion

Identifying risk factors associated with NSLBP gives a rational foundation for developing more effective preventive methods, which are currently missing. In this study, we observed that the severity of NSLBP is associated with lower levels of education, poor daily living standards, demanding physical labor, long periods of driving and sitting, smoking, higher BMI, and patients with chronic NSLBP. Thus, we should avoid these risk factors to limit the incidence of NSLBP. However, more precise prediction methodologies and a better knowledge of NSLBP risk factors necessitate further study.

Author contributions

FAK wrote the initial draft of the manuscript, provided language help, and critically revised it; YAK co-initiated the study and critically revised the manuscript, providing language help and proofreading the article; WA revised the manuscript by providing language help and proofreading the article; DA did all the statistical analysis; XD provided language help.

Funding

None.

Data availability

The datasets generated and/or analyzed during the current study are not publicly available due [to maintain the privacy of the patients participating in the study] but are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The study involving human participants was reviewed and approved by the Neijiang Normal University Institutional Review Board Consent Letter NUU – IRB 202405126 (Clinical Trial Number NUU-0002024123 A). All procedures were conducted under the ethical principles outlined in the 1964 Declaration of Helsinki and its subsequent revisions. All our methods were carried out under relevant guidelines and regulations. Informed consent was obtained from all the participants and their legal guardian(s). For illiterate participants, informed consent was obtained from legally authorized representatives. We explained the purpose of the study to the patients and their family members before using their data in this study. It was all voluntary; no names were taken, so we provided anonymous data collection.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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Received: 7 June 2024 / Accepted: 28 August 2024
Published online: 31 August 2024

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