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Determinants of Pain Intensity in the Patients with Low Back Pain During the Covid-19 Pandemic

Covid-19 Pandemisi Sırasında Bel Ağrısı Olan Hastalarda Ağrı Şiddetinin Belirleyicileri

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ÖZET

Amaç: Çalışmanın temel amacı, COVID-19 pandemisi sırasında bel ağrısı olan hastalarda ağrı şiddetinin olası belirleyicilerini araştırmaktı. Çalışmanın ikinci amacı, pandemi öncesi, izolasyon ve kontrollü sosyal yaşam dönemleri arasındaki ağrı şiddetini karşılaştırmaktı.

Gereç ve Yöntem: Bel ağrısı olan otuz dört kişi çalışmaya dahil edildi. Üç farklı dönem (pandemi öncesi, izolasyon ve kontrollü sosyal hayat dönemleri) değerlendirildi. Ağrı şiddeti Vizüel Analog Skala (VAS) ile değerlendirildi. Gün içindeki oturma ve yürüme süresi sorgulandı.

Bulgular: VAS (p=0,001, η2=0,220), oturma süresi (p<0,001, η2=0,660) ve yürüme süresindeki (p<0,001, η2=0,587) zaman içindeki değişiklikler (pandemi öncesi, izolasyon ve kontrollü sosyal hayat dönemleri) istatistiksel olarak anlamlıydı. En düşük yürüme süresi (p<0,001), en yüksek oturma süresi (p<0,001) ve en kötü VAS skoru (p=0,001) izolasyon dönemindeydi. İzolasyon döneminde VAS skoru ile oturma süresi ilişkiliydi (r=0,471, p=0,005). Doğrusal regresyon analizi, oturma süresinin izolasyon döneminde VAS skorundaki varyansın %19,8'ini açıklayarak VAS skorunun anlamlı ve bağımsız bir belirleyicisi olduğunu gösterdi.

Sonuç: İzolasyon döneminde fiziksel aktivite (oturma ve yürüme süresi) en düşükken ağrı şiddeti en yüksekti. Bu çalışma, oturma süresinin, izolasyon dönemi sırasında bel ağrısı olan hastalarda ağrı şiddetinin bağımsız bir belirleyicisi olduğunu ileri sürmektedir. Ağrı şiddeti, COVID-19 salgını sırasında bel ağrısı olan hastalarda fiziksel aktiviteyi arttırarak ve oturma süresini kısaltarak azaltılabilir.

Anahtar kelimeler: Covid-19, Bel ağrısı, Ağrı şiddeti, Fiziksel aktivite

ABSTRACT

Aims: The main aim of the study was to investigate the possible predictors of the pain intensity in the patients with low back pain (LBP) during the COVID-19 pandemic. The second aim of the study was to compare pain intensity between pre-pandemic, isolation, and controlled social life periods.

Materials and Methods: Thirty-four individuals with low back pain were included in the study. Three different periods (pre-pandemic, isolation, and controlled social life periods) were evaluated. Pain intensity was evaluated by the Visual Analogue Scale (VAS). The sitting and walking time during the day were asked.

Results: The changes over time (pre-pandemic, isolation, and controlled social life periods) in the VAS (p=0.001, η2=0.220), sitting time (p<0.001, η2=0.660), and walking time (p<0.001, η2=0.587) were statistically significant. The shortest walking time (p<0.001), the highest sitting time (p<0.001) and the worst the VAS score (p=0.001) were in the isolation period. The VAS score had correlation with sitting time in the isolation period (r= 0.471, p=0.005). The linear regression analysis revealed that sitting time was a significant and independent predictor of the VAS score by explaining 19.8 % of variance in the VAS score in the isolation period.

Conclusion: During the isolation period, physical activity (sitting and walking time) was lowest, while pain intensity was highest. The present study suggests that sitting time is an independent predictor of pain intensity in the patients with LBP during the isolation period. The pain intensity can be decreased by improving physical activity and reduced sitting time in the patients with LBP during the COVID-19 pandemic.

Keywords: Covid-19, Low back pain, Pain intensity, Physical activity

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INTRODUCTION

Low back pain (LBP) is a prevalent trouble and causes functional impairment, limitations in daily life, and reduced quality of life (1). The global burden of LBP is estimated to increase even further in the coming decades (2). Psychological, social, and biophysical factors are contributors to LBP and disability (3). LBP can be triggered by these contributors (4). Adequate management of LBP mitigates physical and psychological complications (5).

COVID-19 is a severe health problem that affects all over the world in a very brief time (6). A pandemic was declared by the World Health Organization in March 2020 (7). To prevent its rapid spread, preventive measures were taken. Among these, social isolation, economic measures, and healthcare systems are the most major ones. Last of all, outpatient procedures, including pain management, are being postponed or canceled (8). Patients with pain have been negatively affected due to all these changes (9).

Pain is a complex condition that occurs as a result of an interaction of biological, psychological and social factors (9). Psychosocial stressors and physical inactivity are risk factors for pain and they can be trigger pain (9). The COVID-19 pandemic can potentially increase psychosocial stress (9, 10). Additionally, the COVID-19 pandemic dramatically increased physical inactivity (11). Moreover, it has been suggested that a sedentary lifestyle is one of the risk factors for developing LBP (12). Although the pain has been negatively affected during the COVID-19 pandemic, there is a lack of evidence about the possible predictors of the pain intensity. Knowing potential determinants of pain intensity will contribute to target appropriate treatment programs to manage pain in the patients with LBP.

Therefore, to the best of our knowledge, this is the first study that aimed to research the possible predictors of the pain intensity in the patients with LBP during the COVID-19 pandemic. Additionally, the second aim of the study was to compare pain intensity between pre-pandemic, isolation, and controlled social life periods.

MATERIAL and METHODS

Participants and Design

Thirty-four individuals with low back pain were included in the study. Inclusion criteria were low back pain for at least three months, absence of orthopedic, neurological, or cardiac problems that could affect assessments. Patients who received any exercise or using long-term anticoagulant or corticosteroid drugs for their LBP were excluded from the study.

The assessments were made in three different periods:

- *Pre-pandemic period:* The participants were asked to respond retrospectively considering the period before the COVID-19 pandemic.
- *Isolation period:* The lockdown period in which face-to-face treatments were postponed or canceled. The participants were asked to respond retrospectively (considering March, April and May 2020).
- *Controlled social life period*: The period of gradual deconfinement in which face-to-face treatment sessions were resumed (starting from 1st June 2020).

The ethics committee of the University of Health Sciences İzmir Bozyaka Education and Research Hospital approved this study (approval number=07 and date 17/06/2020). All the participants provided written informed consent to participate in the study.

Outcome Measures

The participants' demographic and clinic characteristics (age, gender, height, weight, educational status, and pain intensity) were assessed.

Pain intensity was evaluated by the Visual Analogue Scale (VAS). The VAS of all participants was questioned in order to state the pain they felt in the sitting position and during the daytime. It provides a statistically measurable and reproducible assessment of pain intensity. Participants marked their pain intensity on a 100 mm line (0:no pain, 100: worst pain) (13).

The sitting time during the day was asked. It represents the level of physical inactivity (14). In addition, the daily walking duration of the participants was recorded.

Sample Size

G*Power Software (ver. 3.1.9.2, Düsseldorf, Germany) was used to calculate the minimum required sample size. A previous study showed that daily sitting time increased due to the pandemic (sitting time before the pandemic: 418.59 ± 201.58 min/day; during the pandemic: 525.35 ± 194.57 min/day) (15). Based on this study, the minimum required sample size was calculated as 30 participants for the effect size of 0.538, the probability level of 0.05, and the statistical power level of 80%.

Statistical Analysis

The data was analyzed using the IBM® SPSS® Statistics for Windows software (Version 20.0. Armonk, NY: IBM Corp.). Shapiro-Wilk test and histograms were used to check normality. The significance level was set at $p<0.05$.

To evaluate whether there was a difference between pain intensity, sitting and walking time in the pre-COVID-19 pandemic, isolation, and controlled social life periods, 'repeated measures analysis of variance with Bonferroni correction' was used.

To examine the correlation between the VAS and other outcomes in the pre-COVID-19 pandemic, isolation, and controlled social life periods, the Pearson correlation coefficient was used.

Multiple linear regression (Stepwise regression) analysis was used to identify variables that might affect the best predictors of VAS score during the isolation period. Variables significantly associated with the VAS score were included in the regression model for patients with LBP.

RESULTS

A total of thirty-four individuals with low back pain with a mean age of 50.61±15.09 years included in the study. The clinic and demographic characteristics of participants are presented in Table 1.

Table 1. Characteristics of the participants

Variables (n =34)	**Mean± SD**
Age (years)	50.61±15.09
Sex, female (n, (%))	25 (73.5)
Height (cm)	165.17±7.27
Weight (kg)	74.50±11.39
Body mass index (kg/m^2)	27.40±4.54
Pain duration (years)	3.76 ±3.41
Education	
University (n, (%))	10 (29.4)
High school (n, (%))	7 (20.6)
Primary school (n, (%))	17 (50.0)

Values are expressed as mean ± standard deviation for continuous variables and frequencies are reported for categorical variables.

The changes over time (pre-pandemic, isolation, and controlled social life periods) in the VAS ($p=0.001$, $\eta^2=0.220$), sitting time ($p<0.001$, $\eta^2=0.660$), and walking time ($p<0.001$, $\eta^2=0.587$) were statistically significant (Table 2). The shortest walking time was in the isolation period ($p<0.001$) (Table 2). The highest sitting time ($p<0.001$) and the VAS score ($p=0.001$) were in the isolation period (Table 2).

Table 2. Comparison of pain intensity, sitting and walking time

	Pre-Pandemic Period	Isolation Period	Controlled Social Life Period	Pairwise Comparisons	p[1] value	Time p[2] value	Time Partial Eta Squared
VAS (cm)	5.61±1.4	6.58±1.9	6.02±1.5	1-2	**0.003**	**0.001**	0.220
				1-3	0.138		
				2-3	**0.025**		
Sitting time (min/day)	156.17±35.2	309.70±86.3	165.58±42.7	1-2	**<0.001**	**<0.001**	0.660
				1-3	0.592		
				2-3	**<0.001**		
Walking time (min/day)	105.88±45.0	40.88±38.7	82.05±28.8	1-2	**<0.001**	**<0.001**	0.587
				1-3	**0.002**		
				2-3	**<0.001**		

Notes: Values are expressed as mean ± standard deviation. p[1]= Adjustment for multiple comparisons: Bonferroni; p[2]= Repeated measures analysis of variance.

Abbreviations: VAS: Visual Analogue Scale, 1: Pre-Pandemic Period, 2: Isolation Period, 3: Controlled Social Life Period

The VAS score had correlation with sitting time (r=0.471, p=0.005) in the isolation period (Table 3). There was no correlation between the VAS score and characteristics of demographic (age, body mass index, height, weight) and walking time in the isolation period (p>0.05, Table 3). There was no correlation between the VAS score and other outcomes in pre-pandemic and controlled social life periods (p>0.05, Table 3).

The linear regression analysis revealed that sitting time was a significant and independent predictor of the VAS score by explaining 19.8% of the variance in the VAS score in the isolation period (Table 4). The regression equation formula is;

'The VAS score=3.284+(Sitting time*0.011)' in patients with LBP during the isolation period.

Table 3. Correlation between the VAS and other assessments

	Pre-Pandemic Period		Isolation Period		Controlled Social Life Period	
	r*	p value	r*	p value	r*	p value
Age (years)	-0.039	0.825	0.056	0.753	0.229	0.192
Height (cm)	0.083	0.642	-0.097	0.585	-0.115	0.517
Weight (kg)	0.001	0.996	0.192	0.277	0.238	0.176
Body mass index (kg/m^2)	-0.037	0.837	0.236	0.180	0.277	0.113
Sitting time (min/day)	-0.180	0.308	0.471	**0.005**	0.058	0.746
Walking time (min/day)	0.258	0.141	0.065	0.715	0.232	0.187

*Pearson's product moment correlation coefficient. Bold values indicate significant p values (< 0.05)

Table 4. Multiple linear regression model of the VAS in isolation period

Variable	B	SE	Beta	p	R^2
Constant	3.284	1.134	-	**0.007**	-
Sitting time (min/day)	0.011	0.004	0.471	**0.005**	0.198

$R=0.471$, $R^2=0.222$, adjusted $R^2=0.198$ ($F=9.129$)
B: unstandardized regression coefficient, SE: standard error, VIF: Variance Inflation Factors
VAS: Visual Analogue Scale

DISCUSSION

To the best our knowledge, this study was the first which determined the possible predictors of the pain intensity and formulated regression equations to predict the VAS score in the patients with LBP in the isolation period. Our study demonstrated that sitting time was an independent determinant of pain intensity in patients with LBP during the isolation period. Additionally, this study showed that the highest pain intensity, the longest sitting time, and the shortest walking time were in the isolation period.

The COVID-19 pandemic has affected business, social life, the healthcare sector worldwide (10). Outpatient procedures, including pain management services, have been postponed or canceled (8). All these problems caused disruptions in pain management. These are likely to increase the likelihood of chronic pain symptoms to worsen (10). In accordance with the literature, our study demonstrated that the highest pain intensity was in the isolation period. Social isolation, canceled health services, and psychological/physical influences might be the reasons for the highest level of pain during the isolation.

The level of physical activity has dramatically decreased due to the measures taken during the pandemic (16-18). Physical inactivity has been reported to be associated with high-intensity disability and low back pain (19). To the best of our knowledge, no other studies have investigated predictors of pain intensity during the COVID-19 pandemic in the patients with LBP, which makes comparisons more difficult. However, it has been suggested that a sedentary lifestyle is one of the risk factors for developing LBP (12). LBP is provoked by sitting behaviour and time (20). Additionally, numerous chronic musculoskeletal problems have been associated with physical inactivity (21). A previous systematic review has reported that significant increase in LBP prevalence and intensity during the COVID-19 pandemic compared to the pre-pandemic period because of reduced rate of physical activity and the prolonged sitting time (22). Our study showed that the longest sitting time and the shortest walking time were in the isolation period. Furthermore, sitting time was an independent predictor of pain intensity in a patient

with LBP during the isolation period. This finding shows that increased sitting time can cause increased pain intensity in the patients with LBP. Therefore, physical inactivity appears as a changeable risk factor for the pain intensity in the patients with LBP during the isolation period. In addition, the psychological effects of social isolation, including loneliness, distressing pain, somatization, and an increased risk of anxiety and depression, should be addressed in future studies as they can affect pain (22).

This study has some limitations. First, although sitting time represents the level of physical inactivity, more objective measuring instruments may provide new results in this regard. Second, this study was limited to a single center. Therefore, this would decrease the generalizability of the results. Third, we included individuals with low back pain for at least three months, regardless of their diagnosis. Grouping according to diagnoses may be effective in terms of showing diagnosis-based effects. Fourth, retrospective evaluation in the pre-pandemic period is another limitation of our study.

In conclusion, the present study suggests that sitting time is an independent predictor of pain intensity in the patients with LBP during the isolation period. The pain intensity can be decreased by improving physical activity and reduced sitting time in the patients with LBP during the COVID-19 pandemic. While planning treatment programs for the patients with LBP, these predictors should be considered.

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Informed Consent: Written informed consent was obtained from the patient for publication and images.

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