

## Research Article

# Assessment of Sleep and Life Qualities of Patient with Chronic Low Back Pain; Single-Centered, Prospective Observational Study

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### Abstract:

**Objectives:** In this study, it was aimed to evaluate the sleep and quality of life of patients who applied to the pain center with the complaint of chronic low back pain (CLBP).

**Patients and methods:** This prospective observational study was conducted between May and June 2018 at the Diyarbakır state hospital pain center. Fifty adult patients aged between 20 and 78 years {group 1 = PSQI  $\leq$  5 12 patients (24%) with good sleep quality, group 2 = PSQI  $\geq$  5 38 patients with poor sleep quality (76%)} were included in the study. The Sociodemographic Form, Short Form 36 (SF-36), The Roland-Morris Low Back Pain and Disability Questionnaire (RMDQ) and the Pittsburgh Sleep Quality Index (PSQI) were used in the evaluation of the data.

**Results:** The average age of participants was  $42.9 \pm 7.67$  (range 20 - 78) years. The mean RMDQ score of the participants was  $18.1 \pm 4.4$ . Sleep quality was good in 12 (24%), sleep quality in 38 (76%) was poor (mean,  $8.76 \pm 4.04$  points). The highest rated PSQI components were sleep latency, sleep disturbances, and daytime dysfunction. The relationship between the RMDQ score and sleep quality was assessed by t test and the RMDQ scores of the subjects with poor sleep quality were found to be higher, the difference between the groups was statistically significant. There was also a weak relationship between functional disability and sleep quality (Spearman = 0.31;  $p = 0.025$ ), so the higher the disability, the worse the sleep quality. Patients with PSQI sleep quality of 5 and above showed lower SF-36 values and a statistically significant negative correlation between them ( $r = 0.35$ ,  $p < 0.001$ ).

**Conclusion:** The results obtained from the study indicate that it is important to evaluate individuals with CLBP in terms of sleep and quality of life.

**Keywords:** Chronic low back pain, sleep quality, quality of life, functional disability

## 1. Introduction

Chronic low back pain (CLBP) is defined as the dorsal area pain that is located between 12th thoracic spine and the inferior part of the gluteal region, accompanied by sciatica in some cases<sup>1</sup>. CLBP is a very common health problem affecting people of all ages that can be seen in all societies<sup>2,3</sup>, which adversely affect the condition of physical, mental, social and the general health situation. There is considerable research in the literature that CLBP negatively affects the patient's quality of life, psychosocial and emotional status<sup>4,5</sup>. Pain affects patients' psychological well-being and quality of life parameters such as sleep as well as limitation of physical movement<sup>6</sup>. The majority of studies have shown that more than 50% of people with CLBP have sleep disorders<sup>7-9</sup>. Sleeping is a remedy for the body and can cause significant physiological and psychological changes when inactivated. In the long term, these changes can also lead to the emergence of other diseases<sup>10,11</sup>. Chronic pain causes sleep disorder, which negatively affects the patient in terms of her/his mood, a perceived pain severity and quality of life. As a result of these, pain will disturb sleep quality and lead to insomnia, which will

also increase the pain.

Chronic pain can cause permanent functional changes in neural systems that regulate both sleep and pain. Because sleep disorders and CLBP have a complex relation, this mechanism has not been well understood yet and needs to be investigated.

Although the relationship between CLBP and sleep quality has been examined in many studies, these studies are inadequate<sup>9,12-14</sup>. In this study, it was aimed to evaluate the sleep and living qualities of individuals with CLBP due to lumbar disc herniation.

## 2. Material and Methods

### 2.1. Study Design

This prospective observational study was carried out between May and June 2018 at Diyarbakır State Hospital pain clinic, which is affiliated to the Ministry of Health, Diyarbakır / Turkey. The written informed consent was obtained from each participant.

### 2.2. Sampling choice

The criteria for inclusion in this study are as follows: patients admitted with medical complaints of waist and leg pain that did not respond to medical treatment and physically treated after receiving Lomber MR scans by the neurosurgical outpatient clinic and physical therapy outpatient clinic between May and June 2018 at Diyarbakir State Hospital pain clinic. All the patients included in the sample were informed about the study and the ones who agreed to participate on the volunteer basis were included in the study. During this period, about 400 patients who adhered to the current criteria applied to the clinic. The criteria for exclusion in this study: patients being under 20 years and over 78 years old, having a chronic psychiatric illness (Eg chronic schizophrenia, bipolar disorder, recurrent major depressive disorder, alcohol-substance use disorders, mental retardation, etc.), a chronic general medical illness chronic sinusitis, obesity, nasal polyp, allergic rhinitis, continuous drug use, and cigarette smoking. The exclusion criteria were 85 eligible individuals for post-study, and 50 of these individuals agreed to participate in the study.

### 2.3. Data collection tools:

#### 2.3.1. Sociodemographic Data Form

A sociodemographic form prepared by the researchers was used to collect sociodemographic data. Participants' age, marital status, education status, working status, general medical and psychiatric CV information were obtained by the means of this form.

#### 2.3.2. Roland-Morris Disability Questionnaire (RMDQ)

It is a questionnaire developed to evaluate functional deficits in patients with low back pain<sup>15,16</sup>. A questionnaire consisting of 24 questions about functional disabilities is asked to answer yes if each sentence follows its own state, and no if it does not. The answers for yes are "1", the answers for no are calculated as "0", the total score is between 0-24 and the higher score means more disability<sup>15</sup>.

#### 2.3.3. Short Form 36 (SF-36)

It is a self-assessment scale with generic criteria. It consists of 36 items providing eight dimension measurements: physical function, social function, role limitations due to physical problems, role limitations due to emotional problems, mental health, energy / vitality, pain and general perception of health. The score range changes from 0 (lowest) to 100 (highest) and high scores indicate better quality of life. All fields are scored independently. SF-36 scores on the quality of life scale are classified for each category as follows: 87 - 100 "excellent", 75,5 - 86,9 "very good", 56 - 75,4 "good", 30,6 - 55,9 "bad" and 0 - 30,5 "very bad". There is no overall quality of life score. The scale was developed by Rand Corporation and its validity and reliability in Turkish was done by Koçyiğit<sup>17,18</sup>. SF-36 scale was examined with reliability analysis. According to this, since the scale is reliable and the scale is summability feature, scores obtained from 36 questions constituting the scale were collected and evaluated as SF-36 score.

#### 2.3.4. Pittsburgh Sleep Quality Index (PSQI)

PSQI is a measure which provides knowledge about the type and severity of sleep quality and disturbance in the last one month. The scale consists of 24 questions in total. While 19 of the questions are answered by the person, the other 5 questions are filled by the bed-mate of the person. When the questions answered by the person are taken into the evaluation, the questions answered by the bed-mate are not taken into consideration. Seven sub-dimensions including subjective sleep quality, sleep latency, sleep duration, usual sleep activity, sleep disturbance, sleeping drug use, and daytime dysfunction are evaluated with 19 questions answered by the person. Each item in the measurement takes a value between 0 (no annoyance) and -3 (serious annoyance). The sum of the scores for seven sub-dimensions gives the total PSQI score. The score of each sub-dimension ranges from 0 to 3. The total PSQI score ranges from 0 to 21. Sleep quality of those with a total score of 5 or less is considered "good"<sup>19,20</sup>. The Turkish validity and reliability study of the scale was performed by Ağargün et al.<sup>21</sup>.

### 2.4. Interventions and Measurements

Individuals eligible for post-exclusion criteria were informed about the study and their written informed consent was obtained from all the individuals who agreed to participate in the study. The study was carried out in Diyarbakir State Hospital pain clinic and the sociodemographic form, SF-36, RMDQ and PSQI forms were distributed by the researchers. It was adhered to ethical principles throughout the collection, storage and information of participants.

### 2.5. Statistical Analyses

All the analyzes were carried out by mean of Windows SPSS software (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, version 22.0, Armonk, NY: IBM Corp.). Appropriateness of variables was investigated with visual and analytical methods. Descriptive statistical data was presented as mean, standard deviation, numbers, and percentage. The t-test was used when the normal distribution characteristics were compared between the groups, and the Mann-Whitney U test and the Kruskal Wallis test were used in the other case. In the comparison of the ratios between the groups, the square test; Spearman or Pearson correlation tests were used according to the distribution of the correlation. Correlation strength was classified as follows: low,  $r \leq 0.4$ ; moderate,  $r = 0.4$  to  $0.5$ ; and high,  $r \geq 0.5$ . (23) The data were evaluated at a 95% confidence interval. A value of  $p < 0.05$  was accepted as statistically significant.

### 2.6. Ethics, Consent and Permissions

This was a single-center, prospective, randomized, clinical trial, approved by the Ethics Committee of Diyarbakir Training and Research Hospital, Turkey (no. 2017/ 90, Chairperson Professor Mehmet Nuri Ozbek), on December 29, 2017 and conducted according to the guidelines of the Helsinki Declaration. The trial was registered at anzctr.org.au (ACTRN12618000574246). The written informed consent was obtained from all patients and surrogates before

participation.

**3. Results**

Fifty patients with low back pain were included in this study. According to the sociodemographic data form, 27 (54%) of these patients were male and 23 (46%) were female. The mean

age was  $42.9 \pm 7.67$  (range: 20 to 78) and the majority consisted of male patients. In addition, the vast majority of patients were lomber discopathies (85%). 70% were married and the majority (66%) were not working. The literacy rate was higher. Demographic data of the patients are shown in Table 1.

**Table 1: Distribution of the General Characteristics of the Low Back Pain Patients According to the PSQI Total Score Means**

Table 1: Distribution of the General Characteristics of the Choronic Low Back Pain Patients According to the PSQI Total Score Means					
General Characteristics (n=50)		N	Percent	PSQI Total Score Means X±SS	
Age	20-39	29	58	9.10±4.58	
	40-59	18	36	8.38±3.44	
	60-79	3	6	7.66±1.15	
<i>KW=0.22, p=0.89</i>					
Sex	Female	23	46	10.21±4.11	
	Male	27	54	7.51±3.62	
<i>t=2.46, p=0.01</i>					
Marital status	Married	35	70	8.77±4.21	
	Single	15	30	8.73±3.76	
<i>t=3.41, p=0.97</i>					
Education level	Illiterate	13	26	10.2±4.36	
	primary	14	28	8.3±3.39	
	secondary	10	20	8.7±5.2	
	high school	10	20	8.8±3.3	
	university	3	6	6 ± 2.64	
<i>KW=3.52, p=0.47</i>					
Job	Unemployed	33	66	10.15±3.78	
	Physically active	10	20	5.50±2.99	
	Desk employee	4	8	7.25±4.03	
	Retired	3	6	6.33±3.05	
<i>KW=12.4, p=0.006</i>					
cause	Nonspecific	4	8	8,25±5,85	
	Discopathy	42	84	8,66±4,06	
	Other*	4	8	10,2±2,06	
<i>KW=1.33, p=0.51</i>					

Note: \* scoliosis, spondylolysis, osteophytosis

**Abbreviations:** PSQI; Pittsburg Sleep Quality Index, KW; Kruskal Wallis, t; t-test

As for sleep quality (measured by PSQI), the total score of 76% of patients was above 5 (mean,  $8.76 \pm 4.04$ ), indicating poor sleep quality. The highest scores were PSQI components: Sleep Latency ( $2.0 \pm 0.94$ ), Sleep Disorder ( $1.75 \pm 0.72$ ) and Daytime Dysfunction ( $1.68 \pm 0.80$ ). The prevalence of the highest component in patients with poor sleep quality was Subjective Sleep Quality (92%) and Sleep Latency (84%). The PSQI component with the lowest score was Use of Sleeping Bills ( $1.07 \pm 1.19$ ) (Table 2).

**Table 2: Distribution of the PSQI Total Score Averages of the Low Back Pain Patients**

Table 2: Distribution of the PSQI Total Score Averages of the Choronic Low Back Pain Patients					
PSQI subcomponents	Mean ± SD	PSQI ≤ 5 n = 12		PSQI ≥ 5 n = 38	
		Freq.	%	Freq.	%
Global Sleep	8.76 ± 4.04	12	24	38	76
Subjective Sleep Quality	0.83±0.77	4	8	47	92

Sleep Latency	2.0±0.94	8	16	42	84
Sleep Duration	1.23±1.0	13	26	37	74
Habitual Sleep Activity	1.35±1.22	21	42	29	58
Sleep Disorder	1.75±0.72	22	44	28	56
Use of Sleeping Bills	1.07±1.19	21	42	29	58
Daytime Dysfunction	1.68±0.80	15	30	35	70

**Legend:** PSQI = Pittsburgh Sleep Quality Index

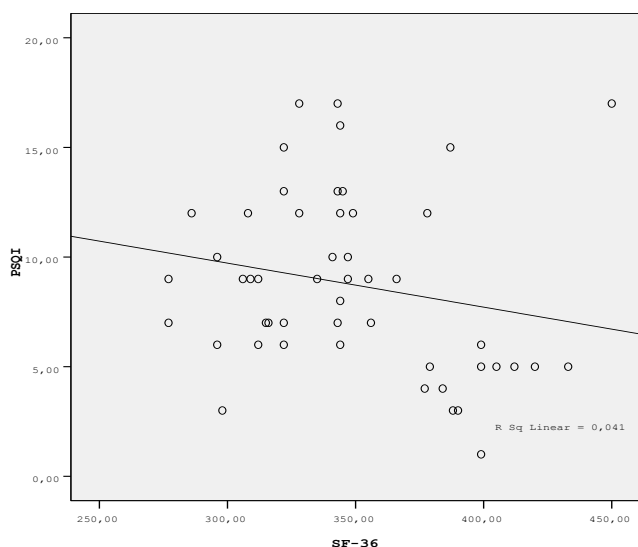
The eight dimensions of the SF-36 have been examined individually. However, the statistical analysis was evaluated as a total score using the summability of the scale. Correlation coefficients of SF-36 total score with scores of patients with PSQI sleep quality of 5 and above were calculated by Pearson correlation analysis. Accordingly, the SF-36 values of patients with PSQI sleep quality of 5 and above were lower, indicating a statistically significant negative correlation between them ( $r = -0.586, p < 0.001$ ). The results are shown in Table 3 (Figure 1).

**Table 3: PSQI's relationship with RMDQ and SF-36 in patients with Choronic Low Back Pain**

Table 3:PSQI's relationship with RMDQ and SF-36 in patients with Choronic Low Back Pain			
	Mean ± SD	PSQI ≤ 5 n = 12	PSQI ≥ 5 n = 38
<b>RMDQ</b>	18,1± 4,4	14±4,82	19,4±3,46
<i>r = 0.42; p = 0.002</i>			
<b>SF-36</b>	348.79 ± 54.94	390.3 ± 33.5	334.5± 33.6
<i>r = - 0.586; p = 0.001</i>			

**Legend:** PSQI; Pittsburgh Sleep Quality Index, SF-36; Short Form 36; RMDQ; Roland-Morris Disability Questionnaire

**Figure 1 – Correlation between scores obtained in the PSQI and in the SF-36**

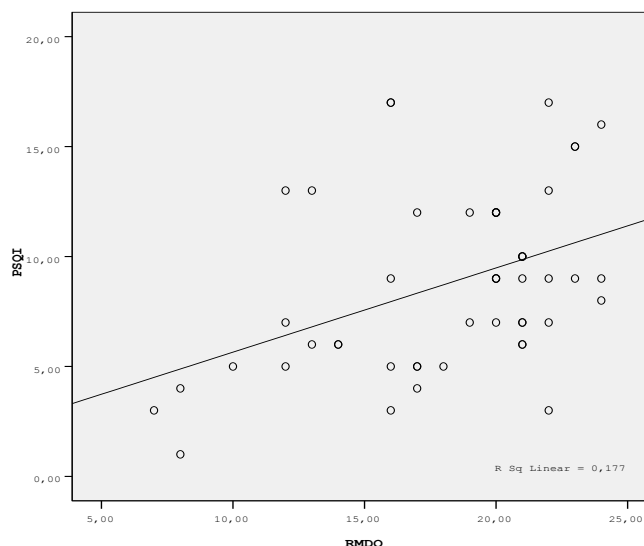


**Legend:** PSQI = Pittsburgh Sleep Quality Index; SF-36 = Short Form 36

Patients' mean Roland-Morris Disability Questionnaire score was  $18.1 \pm 4.4$ , indicating high disability. The RMDQ score of the patients with a total sleep quality score below 5 was  $14 \pm 4.82$ , and  $19.4 \pm 3.46$  in patients with a score above 5 ( $p < 0,05$ ). This result showed that the disability was high in both groups and that sleep quality was poorly correlated with RMDQ ( $r = 0.42, p = 0.002$ ). This correlation was low but linear, suggesting that lower sleep quality may be associated

with higher disability (Table 3) (Figure 2).

**Figure 2 - Association between scores obtained in the PSQI and in the RMDQ**



**Legend:** PSQI = Pittsburgh Sleep Quality Index; RMDQ = Roland-Morris Disability Questionnaire

#### 4. Discussion

We've concluded that there is a weak relationship between high level of sleep disorder prevalence and perceived disability level in patients with chronic low back pain. 76% of the patients had a PSQI total score above 5 (mean,  $8.76 \pm$

4.04), indicating poor sleep quality; the mean score of the Roland-Morris Disability Questionnaire was  $18.1 \pm 4.4$ , indicating high disability.

CLBP is an important public health problem because it is widespread in society and affects the active working population more. In our study, patients with a Pittsburgh Sleep Quality Index (PSQI) score of 5 or less showed a "good" sleep quality (19,20); on the contrary, a "poor" sleep quality of 5 or greater. PSQI has shown that the quality of sleep and life are significantly impaired in individuals with low back pain, according to our study. The review work done by Grainne and his colleagues supports our work. In 17 research papers they examined in this review, they generally provided important evidence that low back pain is associated with sleep problems<sup>12</sup>.

The majority of studies have found a high correlation between low back pain and sleep disturbance and more than 50% of the patients in these studies experienced sleep-related problems<sup>13,22,23</sup>. In our study, sleep disturbance was 76% and it was higher than other studies as our cut-off value was lower. In the two studies; we have realized that sleep quality is above our value, the first was the study by O'Donoghue<sup>14</sup>, who also investigated sleep disorders. There was a high prevalence in individuals whose scores were above 5 in PSQI (86.6%). The second study, conducted by França, V. L et al.<sup>24</sup>, showed that individuals whose scores were above 5 points in PSQI (82.35%) were high again.

In our study, the mean PSQI was  $8.76 \pm 4.04$ , indicating that the individuals involved in the study had poor sleep quality. The PSQI components that received the highest score in our study were Sleep Latency ( $2.0 \pm 0.94$ ), Sleep Disorder ( $1.75 \pm 0.72$ ) and Daytime Dysfunction ( $1.68 \pm 0.80$ ). The sleep latency is a process lasting from going to bed to falling asleep. This result is basically valid even if it was lower than the results of our other studies. The results of the studies performed were respectively between 10.2 and 10.9<sup>9,24-26</sup>. Smith et al suggest that sleep quality is directly related to pain because of the use of the same control system in the brain cortex. They have emphasized that the pain negatively effects the quality of sleep and also insomnia increases pain. It can adversely affect other psychological (anxiety, depression) and biological (age, sex) factors<sup>27,28</sup>.

Studies indicate that women have more sleep problems than men<sup>14,24,25,29</sup>. However, there are studies indicating men have more sleep problems than women<sup>30,31</sup>. In our study, it has been realized that female patients with low back pain have more sleep disorders than males even though males have more low back pain..

It is expected that marital status will not affect sleep quality due to the universal need for sleep. It is thought-provoking that sleep disorder is more common in married people. This case may result from the anxiety, current economic and social problems experienced by married women.

In our study, it was observed that sleep quality decreased as the education level of patients with CLBP decreased. Many researchers have shown that the individuals having better educational backgrounds have a better physical and mental

health; and consequently have a better sleep quality<sup>30-32</sup>.

With regular physical activity, serotonin is secreted, deep resting and regulation of delta sleep is provided. In a study conducted by King et al., the prolongation of exercise activity was emphasized, and the 16-week moderate-intensity exercise increased subjective sleep quality in healthy men and women who did not exercise, but this effect did not occur within the first 8-week period<sup>33</sup>. In our study, it was revealed that sleep disorders in patients with low back pain are important due to insufficient physical activity. In this case, however, it was realized that there is a need for studies showing the effect of sleep quality on methods that more accurately measure regular physical activity.

In our study, the majority of patients with low back pain were unemployed because they had to leave their jobs due to their low back pain and lack of body power as a consequence of the lack of state security of their jobs.

Limitations:

The lack of objective sleep evaluation techniques in this study, the relatively low number of patients and the absence of the control group constitute the most important limitations. Literature requires similar workloads used sleep analysis laboratories.

## 5. Conclusion:

We found a weak relationship between high level of sleep disorder prevalence and perceived disability level in patients with chronic low back pain. It is important to do further studies on the relationship between these determinations and sleep quality. In addition, a multidisciplinary approach is essential to treat sleep disorders and improve the quality of life of patients with chronic low back pain.

**Informed Consent:** The written informed consent was obtained from the patients who participated in this study.

**Author contributions:** Concept - E.G.; Design - E.G., A. K. ; Supervision - A. K. ; Resource - E. G., A. K. ; Materials - E. G.; Data Collection & / RTI & gt; and / or Processing - E.G., A. K. ; Analysis & / RTI & gt; and / or Interpretation - A. K. ; Literature Search - E. G., A. K. ; Writing - E.G. ; Critical Reviews - E.G.

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

**Financial Disclosure:** The authors declare that this study has received no financial support.

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