

## Clinical Research

# Investigation of The Effects of Restless Legs Syndrome on Sleep Quality and Quality of Life: A Controlled Study

İlker ÖZDEMİR<sup>1,a</sup>, Adnan Burak BİLGİÇ<sup>2</sup>, Erkan KURU<sup>3</sup>

<sup>1</sup>Giresun Üniversitesi Tıp Fakültesi, Psikiyatri Anabilim Dalı, Giresun, Türkiye

<sup>2</sup>Sağlık Bilimleri Üniversitesi Haydarpaşa Numune Eğitim ve Araştırma Hastanesi, Nöroloji Kliniği, İstanbul, Türkiye

<sup>3</sup>Serbest Hekim, Psikiyatri, Ankara, Türkiye

### ABSTRACT

**Objective:** Restless legs syndrome is a common neurological disorder that may cause sleep problems and have negative effects on daily life. We've aimed to investigate the domains of quality of sleep and life on which this syndrome impacts and the effects of sociodemographic variables and the severity of the syndrome.

**Material and Method:** We've included 47 patients newly diagnosed with primary restless legs syndrome and a control group of 67 participants. "Sociodemographic Data Form", "International Restless Legs Syndrome Study Group Rating Scale for Severity of Restless Legs Syndrome", "The Pittsburgh Sleep Quality Index", and "The World Health Organization Quality of Life Instrument Short Form Turkish Version" were applied to the participants.

**Results:** Patient and control groups were similar in many fields in terms of sociodemographic variables. Patient group had significantly higher sleep problems and lower quality of life compared to the control group. There was no difference among the genders in the patient group in terms of severity of the symptom. Although the severity of the symptom was similar among the smokers and nonsmokers in the patient group, the smoker group had higher level of sleep problems. Severity of the symptom demonstrated a positive correlation with sleep, and negative correlation with quality of life.

**Conclusion:** Restless legs syndrome has negative effects on sleep and quality of life. Such effects are impacted by the severity of the symptom.

**Keywords:** Restless Legs Syndrome, Quality of Life, Sleep Disorder.

### ÖZ

#### Huzursuz Bacaklar Sendromunun Uyku ve Yaşam Kalitesine Etkisinin İncelenmesi: Kontrollü Çalışma

**Amaç:** Huzursuz bacaklar sendromu yaygın görülen, uyku ve günlük yaşamda olumsuzluklara yol açabilen nörolojik hastalıktır. Çalışmamızda bu sendromun uyku ve yaşam kalitesini hangi alanlarda etkilediğini, sosyodemografik değişkenlerin ve hastalık şiddetinin bu duruma etkilerini incelemeyi amaçladık.

**Gereç ve Yöntem:** Çalışmamıza 47 yeni tanı almış primer huzursuz bacaklar sendromlu hasta ve 63 kontrol grubu dahil edilmiştir. Katılımcılara "Sosyodemografik Veri Formu", "Uluslararası Huzursuz Bacaklar Sendromu Çalışma Grubu Huzursuz Bacaklar Sendromu Şiddet Skalası", "Pittsburgh Uyku Kalitesi İndeksi" ve "Dünya Sağlık Örgütü Yaşam Kalitesi Ölçeği Kısa Formu Türkçe Versiyonu" uygulanmıştır.

**Bulgular:** Hasta ve kontrol grupları sosyodemografik değişkenler açısından birçok alanda benzerdi. Hasta grubu, kontrol grubuna göre anlamlı düzeyde yüksek uyku sorunlarına ve düşük yaşam kalitesine sahipti. Hasta grubunda cinsiyetler arasında semptom şiddeti açısından fark yoktu. Hasta grubunda sigara kullanan ve kullanmayanlar arasında semptom şiddeti benzer bulunsu da sigara kullanan grup daha yüksek uyku sorunlarına sahipti. Semptom şiddeti uyku ile pozitif yönlü, yaşam kalitesi ile negatif yönlü korelasyon göstermekteydi.

**Sonuç:** Huzursuz bacaklar sendromu yaşam ve uyku kalitesi üzerine olumsuz etkilere sahiptir. Bu etkiler semptom şiddetinden etkilenmektedir.

**Anahtar Sözcükler:** Huzursuz Bacaklar Sendromu, Yaşam Kalitesi, Uyku Bozukluğu.

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**ORCID IDs:** İ.Ö. 0000-0002-3531-3280, A.B.B. 0000-0002-5216-1573, E.K. 0000-0003-1949-4007.

Restless Legs Syndrome (RLS) is a chronic disorder which is commonly characterized by abnormal sensations accompanied by pain in legs and/or any part of the body and the sense of restlessness. RLS, also known as Willis-Ekbom Disease, is a sensorimotor disorder characterized by an unpleasant and uncomfortable sensation which generally occurs in the lower extremities at nighttime and at rest, and eases by moving the legs (1, 2).

While RLS, which causes complaints that can be described as pain, numbness, twitching, itching, etc., was diagnosed by identifying the five criteria determined by The International Restless Legs Syndrome Study Group (IRLSSG), the requirements of insomnia or daytime symptoms were introduced by the International Classification of Sleep Disorders-Third Edition in 2014 (3). There are varying conclusion in the literature on the prevalence of RLS, and the prevalence varies in

<sup>a</sup>Yazışma Adresi: İlker ÖZDEMİR, Giresun Üniversitesi Tıp Fakültesi, Psikiyatri Anabilim Dalı, Giresun, Türkiye

Tel: 0454 310 2020

Gelis Tarihi/Received: 21.02.2022

e-mail: ilkerozdemir249@yahoo.com

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the range of 1-15% in the adult population (4). It is known to cause sleep disorder due to symptoms becoming more apparent generally at nighttime (5). RLS is a clinical condition which can disrupt the normal life functions as a frequent cause of sleep disorders (6). Causing various sleep problems such as sleep onset latency, frequent awakening, and daytime sleepiness, RLS was used to be referred to as a mild neurological disorder in the beginning, today, it is demonstrated that the disorder negatively impacts the quality of life with physical, psychological, and social effects (2, 7). In this study, we've planned to investigate the effects of the disorder and its severity on sleep and quality of life in individuals diagnosed with RLS. It was desired to investigate whether sleep problems differed compared to the control group, whether sociodemographic variables affect sleep problems in RLS, whether sleep problems worsen according to RLS severity, whether the presence of RLS affects quality of life, and whether there is a relationship between RLS severity and quality of life.

## MATERIAL AND METHOD

### Study Plan

In determining the sample size in our study, the mean difference sample size formula was used, type 1 error was determined as 0.05, type 2 error was determined as 0.20 and the effect size was calculated as 0.50. Accordingly, it was concluded that at least 102 participants (case+control) were required for the study. Forty seven individuals diagnosed with RLS based on clinical evaluations and IRLSSG diagnostic criteria and secondary causes excluded, who have applied to neurology outpatient clinic between December 2019 and February 2020, were included in our study by random and non-probable sampling method. Sixty-three healthy volunteers were included by random sampling as part of the same process. Participants were interviewed and evaluated face to face at first by neurologist. After neurological evaluation, if the patient was diagnosed with RLS, was referred to a psychiatrist. The patient is subjected to a detailed psychiatric examination. Following the evaluation interviews, if there is not any ongoing neurodevelopmental disorder, alcohol and/or substance abuse, the clinician administered the mandatory self-evaluation scales to the patients diagnosed with RLS prior to starting the treatment. This is an observational and cross-sectional study with a control group.

Study inclusion criteria were determined as being at the age of 18 and older, nonexistence of an ongoing neurodevelopmental disorder, and nonexistence of alcohol and/or substance abuse. Participants with known iron deficiency anemia, pregnancy, polyneuropathy, chronic kidney failure, oral contraceptive users, and participants receiving RLS treatment were excluded from the study.

We've obtained Ethics Committee approval dated 09.01.2019 and numbered KAEK-85 for our study. Our study was carried out in accordance with the Declaration of Helsinki.

### Data Collection Tools

**Sociodemographic Data Form:** This is a semi-structured evaluation tools created by the researchers prepared for the purpose of collecting general or RLS related demographical and sociocultural data of the participants.

**International Restless Leg Syndrome Study Group (IRLSSG) Rating Scale for Severity of RLS (RLSSS):** Developed by IRLSSG, this scale comprises of 10 questions, each having a score range of 0-4, intended to determine the severity of the disorder (8). Severity of RLS can be staged based on the scored derived from the scale. Score 0-10 is evaluated as "mild", score 11-20 as "moderate", score 21-30 as "severe", and score 31-40 "very severe" RLS.

**Pittsburgh Sleep Quality Index (PSQI):** Intended to evaluate the existence and severity of sleep problems over the last month and comprising 19 questions, PSQI is developed by Buysse et al., and Turkish version is adapted by Ağargün et al (9,10). The scale comprises seven sub-domains of subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disorder, sleep medication, and daytime dysfunction. Total score of 5 and above indicates a clinically poor sleep quality at a significant level (9,10).

**The World Health Organization Quality of Life Instrument Short Form Turkish Version (WHOQOL-BREF-TR):** Intended to evaluate the quality of life of the individuals over the last 15 days, this index is developed by the World Health Organization, and Turkish adaption is available (11,12). While the original version comprises 26 questions, Turkish version has 27 questions. The index includes sub-domains of physical health, psychological health, social relationships, and environmental health, and measures the satisfaction with general quality of life and health.

### Statistical Method

Sample size and power analyzes were calculated using the G Power program. Data collected in the study were analyzed using SPSS (Statistical Package for the Social Sciences) for Windows 26 software (SPSS Inc., Chicago, IL, USA). Continuous variables were expressed as mean±standard deviation, and categorical variables were expressed as counts and percentages. Kolmogorov-Smirnov Test was used to determine the compatibility of continuous variables to normal distribution. Continuous variables did not manifest normal distribution. Thus, Mann Whitney U Test was used for the comparison of quantitative data among two independent groups, Kruskal-Wallis H Test was used for the comparison of quantitative data among multiple independent groups. Pearson Chi-square test was used for the comparison of categorical data. Pearson Correlation

Test was used to evaluate the correlation level among the scales administered to the participants. Significance level was taken as  $p < 0,05$  in the statistical analyses.

**RESULTS**

While the ages of 110 participants included in the study ranged from 27 to 75, their duration of study ranged from 5 to 16 years. Patient and control groups had similar characteristics in terms of gender, marital status, level of income, existence of additional medical diseases, smoking, existence of history of suicide attempts, and substance abuse. The groups were not similar in terms of age and duration of study, and varied in terms of occupational groups, existence of alcohol use, and existence of psychiatric disorder (Table 1).

*Table 1. Sociodemographic variables and intergroup comparisons.*

	Patient n (%)	Control n (%)	Test Statistic	p
<b>Gender</b>				
Female	37 (78,7)	47 (74,6)	$\chi^2=0,076$	0,782*
Male	10 (21,3)	16 (25,4)		
<b>Marital Status</b>				
Married	39 (83,0)	50 (79,4)	$\chi^2=0,054$	0,817*
Single	8 (17,0)	13 (20,6)		
<b>Profession</b>				
Not working	21 (44,7)	7 (11,1)	$\chi^2=31,044$	<0,001*
Blue color/White color	9 (19,1)	45 (71,4)		
Retired	12 (25,5)	9 (14,3)		
Student	5 (10,6)	2 (3,2)		
<b>Income</b>				
0-1000	5 (10,6)	7 (11,1)	$\chi^2=2,184$	0,336*
1001-3000	11 (23,4)	8 (12,7)		
3001 and above	31 (66)	48 (76,2)		
<b>Additional Medical Illness</b>				
Yes	28 (59,6)	27 (42,9)	$\chi^2=2,378$	0,123*
No	19 (40,4)	36 (57,1)		
<b>Psychiatric disorder</b>				
Yes	24 (51,1)	14 (22,2)	$\chi^2=8,668$	0,003*
No	23 (48,9)	49 (77,8)		
<b>Cigarette Smoking</b>				
Yes	18 (38,3)	25 (39,7)	$\chi^2=0,000$	1,000*
No	29 (61,7)	38 (60,3)		
<b>Alcohol intake</b>				
Yes	2 (4,3)	19 (30,2)	$\chi^2=10,076$	0,002*
No	45 (95,7)	44 (69,8)		
<b>Suicide Attempt History</b>				
Yes	4 (8,5)	3 (4,8)	$\chi^2=0,629$	0,458*
No	43 (91,5)	60 (95,2)		
<b>Shift working</b>				
Yes	6 (12,8)	15 (23,8)	$\chi^2=1,471$	0,225*
No	41 (87,2)	48 (76,2)		
	<b>Patient (Mean ± SD)</b>	<b>Control (Mean ± SD)</b>		<b>p</b>
<b>Age</b>	52,63 ± 13,97	47,00 ± 12,03		0,031**
<b>Years of Education</b>	7,44 ± 3,75	11,58 ± 3,57		<0,001**

\* chi-square test, \*\*Mann Whitney U Test,  $\chi^2$ : chi-square test statistic, n: Number.

Mean age of the patient group was 54. Patients were divided into two groups based on such value as <54 age and ≥54 age. Mean RLSSS scores of the two

groups were 28,34±8,08 and 32,50±6,27, respectively. Groups were significantly different from one another in terms of RLSSS scores ( $p < 0,05$ ).

78,7% (n :37) of the patient group was female, and 21,3% (n :10) was male. While mean RLSSS score in the female group was 31,13±6,28, it was 28,00±10,79 in the male group. RLSSS scores were similar among the genders ( $p > 0,05$ ).

Total mean PSQI score in the female patient group 10,56±3,98, and 9,50±4,71 in the male patient group. There was no significant difference among the total PSQI scores of the patient group by gender ( $p > 0,05$ ).

38,3% (n :18) of the patient group was smokers, and 61,7% (n :29) was not regular smokers. While mean RLSSS scores of the smoker group was 32,11±5,56, it was 29,44±8,33 in the nonsmoker group. No significant difference was observed among the smokers and nonsmokers in terms of RLSSS scores ( $p < 0,05$ ). While the mean PSQI score of smokers was 12,83±3,74, the mean PSQI score of the nonsmokers was 8,79±3,58. There was significant difference among the groups ( $p < 0,05$ ).

Groups were compared in terms of RLSSS, WHOQOL-BREF-TR, PSQI index scores. Total RLSSS score manifested significant difference in the patient and control groups ( $p < 0,001$ ). WHOQOL-BREF-TR general quality of life, health satisfaction, and physical health sub-domain scores were identified as significantly higher in the control group ( $p < 0,05$ ). WHOQOL-BREF-TR psychological health, environmental health, and social relationships sub-domain scores were similar among the groups ( $p > 0,05$ ). Total score of PSQI index and all sub-domain scores were significantly higher in the patient group ( $p < 0,05$ ) (Table 2).

*Table 2. Comparison of parameters by groups.*

Scale	Patient (Mean ± SD)	Control (Mean ± SD)	P
WHOQOL Physical Health	21,29 ± 5,69	26,14 ± 4,85	<0,001*
WHOQOL Psychological Health	20,72 ± 5,03	22,19 ± 4,13	0,069
WHOQOL Social Relationships	9,34 ± 3,02	10,33 ± 2,68	0,105
WHOQOL Environmental Health	31,70 ± 5,66	32,17 ± 5,09	0,582
WHOQOL General Quality of Life	2,87 ± 1,11	3,31 ± 0,79	0,041
WHOQOL Health Satisfaction	2,42 ± 1,31	3,42 ± 0,75	<0,001*
HBSSSTOP	30,46 ± 7,44	6,44 ± 9,05	<0,001*
Subjective Sleep Quality	1,77 ± 0,81	1,34 ± 0,84	0,006*
Sleep Latency	1,96 ± 0,83	1,03 ± 0,84	<0,001*
Sleep Duration	1,45 ± 1,09	0,50 ± 0,87	<0,001*
Sleep Efficiency	1,10 ± 1,04	0,44 ± 0,79	<0,001*
Sleep Disturbance	1,87 ± 0,74	1,42 ± 0,55	0,002*
Sleep Medication	0,89 ± 1,22	0,17 ± 0,58	<0,001*
Daytime dysfunction	1,29 ± 1,08	0,57 ± 0,75	<0,001*
PSQI Total Score	10,34 ± 4,11	5,50 ± 3,92	<0,001*

SD: Standard Deviation, \*Mann Whitney U Test.

Analyzing the relationship between RLSSS and PSQI in terms of direction and level of correlation among the scales in the patient group; significant correlation in the positive direction was identified among the RLSSS and PSQI total score, subjective sleep quality, and sleep

disorder sub-domains (Table 3). Analyzing the relationship between RLSSS and WHOQOL-BREF-TR; there was significant correlation in the negative direction among the RLSSS, WHOQOL-BREF-TR physical health, psychological health, general quality of life, and health satisfaction sub-domains (Table 3). Analyzing the relationship between PSQI and WHOQOL-BREF-TR; there was significant correlation in the negative direction among the subjective sleep quality and social relationships. No significant correlation was observed among sleep latency and WHOQOL-BREF-TR. We've observed significant correlation in the negative direction among all sub-domains of WHOQOL-BREF-TR except for shortened

sleep duration and general quality of life. There was significant correlation in the negative direction among sleep efficiency and environmental health. There was significant correlation in the negative direction among all sub-domains of WHOQOL-BREF-TR except for sleep disorder and general quality of life. There was significant correlation in the negative direction among the sub-domains of daytime dysfunction and physical health, environmental health, general quality of life, and health satisfaction. There was significant correlation in the negative direction among all sub-domains of WHOQOL-BREF-TR except for total PSQI score and general quality of life (Table 3).

**Table 3.** Evaluation of correlations of scale scores in the patient groups.

SCALE		PSQI									WHOQOL						
		HBSSS	Subjective Sleep Quality	Sleep Latency	Sleep Duration	Sleep Efficiency	Sleep Disturbance	Sleep Medication	Daytime dysfunction	Total	Physical Health	Psychological Health	Social Relationships	Environmental Health	General Quality of Life	Health Satisfaction	
PSQI	HBSSS	r	1	0,320*	0,063	0,178	0,136	0,295*	0,049	0,258	0,293*	-0,423**	-0,299*	-0,286	-0,088	-0,296*	-
		p		0,028	0,674	0,230	0,363	0,044	0,745	0,080	0,045	0,003	0,041	0,051	0,555	0,043	0,587**
	Subjective Sleep Quality	r		1	0,145	0,363*	0,183	0,202	-0,091	0,254	0,446**	-0,266	-0,287	-	-0,280	0,038	-0,250
		p			0,329	0,012	0,218	0,173	0,541	0,085	0,002	0,070	0,050	<0,001	0,057	0,799	0,089
	Sleep Latency	r			1	0,615**	0,529**	0,308*	0,145	-0,058	0,613**	-0,204	-0,241	-0,072	-0,275	0,181	-0,182
		p				<0,001	<0,001	0,035	0,330	0,699	<0,001	0,170	0,102	0,631	0,062	0,223	0,222
	Sleep Duration	r				1	0,694**	0,365*	0,328*	0,178	0,849**	-0,365*	-0,437*	-0,367*	-	-0,41	-0,345*
		p					<0,001	0,012	0,024	0,231	<0,001	0,012	0,002	0,011	0,491**	0,784	0,018
	Sleep Efficiency	r					1	0,242	0,298*	0,355*	0,808**	-0,242	-0,213	-0,128	-0,431*	0,068	-0,160
		p						0,101	0,042	0,014	<0,001	0,101	0,151	0,390	0,003	0,651	0,283
Sleep Disturbance	r						1	0,009	0,293*	0,520**	-0,506**	0,709**	0,592**	0,455**	0,006	-0,345*	
	p							0,954	0,046	<0,001	<0,001	<0,001	<0,001	<0,001	0,967	0,018	
Sleep Medication	r							1	-0,41	0,462**	-0,236	-0,054	-0,061	-0,244	-0,170	-0,080	
	p								0,783	<0,001	0,110	0,716	0,685	0,099	0,253	0,595	
Daytime dysfunction	r								1	0,479**	-0,396**	-0,264	-0,218	-0,322*	-0,310*	-0,366*	
	p									<0,001	0,006	0,073	0,141	0,027	0,034	0,011	
TOTAL	r									1	-0,518**	-	-	-	-0,080	-	
	p										<0,001	0,489**	0,425**	0,590**	0,592	0,401**	
WHOQOL	Physical Health	r									1	0,642**	0,390**	0,504**	0,561**	0,691**	
		p										<0,001	0,007	<0,001	<0,001	<0,001	
	Psychological Health	r										1	0,765**	0,712**	0,381**	0,557**	
		p											<0,001	<0,001	0,008	<0,001	
	Social Relationships	r											1	0,485**	0,207	0,291*	
		p												0,001	0,164	0,047	
	Environmental Health	r												1	0,228	0,315*	
		p													0,124	0,031	
General Quality of Life	r													1	0,631**		
	p														<0,001		

r: Correlation Coefficient, Pearson Correlation Test, \*p <0,05, \*\*p <0,01.

When the RLS severity of the patient population was grouped by RLSSS score, 10,6% (n :5) of the patient group had “moderate”, 31,9% (n :15) had “severe”, and 57,4% (n :27) had “very severe” RLS severity levels. Analyzing the relationship between the RLS severity

groups and WHOQOL-BREF-TR; significant difference was identified among the groups in terms of physical health and health satisfaction sub-domain scores (Table 4).

**Table 4.** Comparison of WHOQOL and PSQI scores according to RLS (Restless legs syndrome) stages.

	RLS Stage			H	p	Moderate - Severe	Very Severe - Moderate	Very Severe - Severe	
	Moderate (n:5)	Severe (n:15)	Very Severe (n:27)						
	Mean±SD	Mean±SD	Mean±SD						
WHOQOL	Physical Health	27,20±4,02	22,00±5,35	19,81±5,49	8,190	<b>0,017*</b>	0,198**	<b>0,016**</b>	0,610**
	Psychological Health	25,00±3,46	21,13±4,37	19,70±5,29	4,816	0,090*			
	Social Relationships	11,80±1,78	9,20±3,07	8,96±3,04	4,854	0,088*			
	Environmental Health	34,20±4,60	30,93±3,26	31,66±6,97	1,701	0,427*			
	General Quality of Life	3,20±0,44	3,26±0,79	2,59±1,27	5,246	0,073*			
	Health Satisfaction	4,00±0,01	3,00±1,19	1,81±1,11	15,255	<b>&lt;0,001*</b>	0,335**	<b>0,002**</b>	<b>0,026**</b>
	Subjective Sleep Quality	1,20±0,44	1,80±0,77	1,85±0,86	3,794	0,150*			
PSQI	Sleep Latency	1,80±0,44	1,93±0,70	2,00±0,96	0,965	0,617*			
	Sleep Duration	1,20±0,44	1,20±0,86	1,62±1,27	1,147	0,563*			
	Sleep Efficiency	1,00±0,01	0,93±0,79	1,22±1,25	0,203	0,903*			
	Sleep Disturbance	1,00±0,01	1,93±0,79	2,00±0,67	8,405	<b>0,015*</b>	<b>0,037**</b>	<b>0,012**</b>	1,000**
	Sleep Medication	0,40±0,89	1,00±1,25	0,92±1,26	1,084	0,582*			
	Daytime dysfunction	1,00±0,70	1,06±1,22	1,48±1,05	1,973	0,373*			
	Total Score	7,60±1,34	9,86±2,99	11,11±4,76	1,715	0,424*			

\*Kruskal-Wallis H test, \*\*Mann Whitney U Test.

Analyzing the relationship between RLS severity groups and PSQI; we've observed significant difference among sleep disorder sub-domain and RLS groups (p <0,05, H :8,405), however, the differences among other sub-domains and RLS groups were not at a significant level (Table 4). Patients were grouped in terms of sleep disorder severities by total PSQI scores. Patients with score PSQI<5 were evaluated as having mild, PSQI≥5 to <10 as moderate, and PSQI≥10 as severe sleep disorder. Accordingly, 42,6% (n :20) of the patients had moderate, and 57,4% (n :27) had severe sleep disorder. Analyzing the relationship between the severity of sleep disorder and WHOQOL-BREF-TR; patients with severe sleep disorder had poorer quality of life compared to patients with moderate sleep disorder. Such difference was at a statistically significant degree in all domains except for general quality of life (Table 5).

**Table 5.** Comparison of WHOQOL scores according to sleep disturbance severity of patient groups.

Scale	Moderate Sleep Disturbance (n :20) (Mean±SD)	Severe Sleep Disturbance (n :20) (Mean±SD)	P
WHOQOL Physical Health	24,80±5,48	18,70±4,35	<b>&lt;0,001*</b>
WHOQOL Psychological Health	23,25±4,75	18,85±4,44	<b>0,008*</b>
WHOQOL Social Relationships	10,25±3,35	8,66±2,61	<b>0,044*</b>
WHOQOL Environmental Health	35,50±5,63	28,88±3,77	<b>&lt;0,001*</b>
WHOQOL General Quality of Life	3,00±1,21	2,77±1,05	0,424*
WHOQOL Health Satisfaction	3,05±1,27	1,96±1,15	<b>0,005*</b>

SD: Standard Deviation, \*Mann Whitney U Test.

## DISCUSSION

RLS is a common neurological disorder that may emerge at any age and may cause significant dysfunctions (13).

While there are studies demonstrating increase prevalence of RLS by aging (14, 15), there are also studies demonstrating that the prevalence of RLS is not related to age (16-18). Despite the fact that there are numerous studies investigating the relationship between age and prevalence of RLS, there are not adequate number of studies that investigate the relationship of age and

severity of RLS. In our study, we've identified the severity of RLS as significantly higher in old age group compared to non-old age group. This data needs to be supported by new studies.

Results obtained in the studies investigating the relationship of RLS with gender mainly demonstrate that it is more frequent and severe in females compared to males (5, 19, 20). Although we've observed higher RLSSS scores in female patients compared to male patients in our study, such difference was not statistically significant. Our study does not differ from the general literature in this context. It is believed that the low number of participants affects such outcome.

There are various studies that investigate the relationship between smoking and RLS. While some of such studies have identified the relationship between smoking and RLS (21-23), some was unable to demonstrate such relationship (24, 25). It is observed that the current data on this subject is conflicting. Although we have not observed any significant difference among the smoker and nonsmoker patient groups in terms of severity of RLS in our study, it is compatible with other studies that are unable to demonstrate the relationship among the two groups. However, our finding which demonstrates higher sleep disorder in the smoker group compared to nonsmoker group suggests that there may be a relationship between smoking and RLS despite the fact that there is a possibility that it may be related to other health issues which smoking may have caused.

One of the key findings of our study was the fact that individuals diagnosed with RLS generally had lower quality of life compared to healthy volunteers and such

difference was apparent in perception of physical health and general quality of life. Studies demonstrate that RLS generally lowers the quality of life (26-28). However, in our study, we've observed that the domains of quality of life, physical health, and health satisfaction decreased significantly as the severity of RLS increased in the patient group. There are studies in the literature on the fact that the quality of life declines as the severity of RLS increases (27, 29, 30). Our study shows similarity with the literature in these aspects.

Another significant finding in our study was the fact that individuals diagnosed with RLS had significantly higher scores in total PSQI and in all sub-domains compared to healthy volunteers. Sleep disorder was common particularly in moderate and severe RLS due to the fact that the symptoms in individuals diagnosed with RLS were mainly observed at nighttime (31). In literature, approximately 85% of RLS patients has disorders such as sleep latency, maintaining sleep, and sleep efficiency, and one out of every three patients reports severe sleep disorders (32-34). Our study supports the literature in this context.

#### **Conclusion**

RLS negatively effects the quality of life and sleep quality, and this is further dramatized as the severity of RLS increases. RLS can be affected by many parameters including age, gender, smoking, etc. This disorder is expected to cause many adverse conditions and to affect functioning negatively, and thus it is one of the most significant disorders which needs to be considered by clinicians in diagnosis and differential diagnosis due its high prevalence.

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