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Assessment of Anxiety, Depression, and Eating Disorder Symptoms Among Patients with Restless Legs Syndrome

Huzursuz Bacak Sendromu Tanılı Hastalarda Anksiyete, Depresyon Ve Yeme Bozukluklarının İncelenmesi

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ABSTRACT

OBJECTIVE: Restless legs syndrome (RLS) is frequently accompanied by psychiatric symptoms such as depression, anxiety, and disordered eating behaviors. This study aimed to investigate the association between RLS severity, depression, anxiety, and the risk of eating disorders.

MATERIALS and METHODS: This retrospective study included 72 patients diagnosed with RLS and 44 age- and sex-matched healthy controls. Depression, anxiety, and eating behaviors were assessed using the Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), and Eating Attitudes Test (EAT-40), respectively. Demographic data and scale scores were compared between groups. Depression and anxiety severity categories were also analyzed.

RESULTS: BDI and BAI scores were significantly higher in the RLS group compared with the control group (p=0.008 and p=0.001, respectively). Mild, moderate, and severe depressive symptoms were more common among RLS patients. Anxiety severity was also markedly higher in the patient group, with severe anxiety observed in 37.5% of patients compared with 9.1% of controls. Although EAT-40 scores and the frequency of eating disorder risk were higher in the RLS group, the differences were not statistically significant (p=0.267). BMI was slightly higher in the patient group but did not reach statistical significance.

CONCLUSION: RLS is associated with significantly increased levels of depression and anxiety, highlighting a substantial neuropsychiatric burden in affected individuals. Although disordered eating tendencies appeared more common in RLS patients, further studies with larger samples are needed to clarify this relationship. Integrating psychiatric evaluation into the routine management of RLS may improve clinical outcomes and overall quality of life.

KEYWORDS: Restless legs syndrome, depression, anxiety, eating disorder risk

ÖZ

AMAÇ: Huzursuz bacak sendromu (HBS), depresyon, anksiyete ve yeme bozukluğu gibi psikiyatrik belirtilerle sıklıkla ilişkilendirilmektedir. Bu çalışmada HBS şiddeti ile depresyon, anksiyete ve yeme bozukluğu riski arasındaki ilişkinin değerlendirilmesi amaçlanmıştır.

GEREÇ ve YÖNTEM: Retrospektif olarak planlanan çalışmaya HBS tanısı alan 72 hasta ve yaş-cinsiyet açısından eşleştirilmiş 44 sağlıklı kontrol dahil edildi. Depresyon, anksiyete ve yeme davranışları sırasıyla Beck Depresyon Envanteri (BDE), Beck Anksiyete Envanteri (BAE) ve Yeme Tutum Testi (YTT-40) ile değerlendirildi. Gruplar arasında demografik veriler ve ölçek puanları karşılaştırıldı. Depresyon ve anksiyete şiddeti kategorileri ayrıca analiz edildi.

BULGULAR: HBS grubunda BDE ve BAE puanları kontrol grubuna göre anlamlı olarak daha yüksekti (sırasıyla p=0,008 ve p=0,001). Hafif, orta ve ağır depresyon belirtileri HBS hastalarında daha sık görüldü. Anksiyete şiddeti de hastalarda belirgin şekilde yüksekti; ağır anksiyete HBS grubunda %37,5 iken, kontrolde %9,1 oranında izlendi. YTT-40 puanları ve yeme bozukluğu riski HBS grubunda daha yüksek olmakla birlikte istatistiksel olarak anlamlı değildi (p=0,267). VKİ hasta grubunda daha yüksek olsa da anlamlı farklılık göstermedi.

SONUÇ: HBS hastalarında depresyon ve anksiyete düzeyleri belirgin derecede yüksektir ve bu durum hastalığın önemli bir nöropsikiyatrik bileşen taşıdığını göstermektedir. Yeme bozukluğu eğilimleri HBS hastalarında daha sık gözlense de bu ilişkinin netleşmesi için daha geniş örneklemli çalışmalara ihtiyaç vardır. HBS'nin klinik yönetiminde psikiyatrik değerlendirmenin entegrasyonu, yaşam kalitesinin artırılmasına katkı sağlayabilir.

ANAHTAR KELİMELER: Huzursuz bacak sendromu, depresyon, anksiyete, yeme bozukluğu riski

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INTRODUCTION

Restless Legs Syndrome (RLS) is a sensory and motor disorder characterized by unpleasant sensations and pain, particularly in the legs, accompanied by an uncontrollable urge to move the limbs during periods of rest or sleep. Symptoms typically appear during inactivity, worsen at night, and may lead to emotional distress (1). In 30-50% of patients diagnosed with RLS, other body parts—particularly the arms—may also be affected to varying degrees of symmetry (2). The prevalence of RLS in the general population is approximately 5-15%, and it is more common in women (1-3). The age of onset has a bimodal distribution, with a peak around 20 years old and another around age 40 (4).

RLS is classified into two categories based on etiology: primary (idiopathic) and secondary. Primary RLS accounts for 70-80% of all cases and typically has an early onset, slow progression, and a strong familial tendency (5). Diagnosing primary RLS requires exclusion of known secondary causes. Secondary RLS is associated with conditions such as iron deficiency, chronic kidney failure, and pregnancy. Compared to the primary form, secondary RLS usually has a later onset and progresses more rapidly (6).

The discomfort caused by RLS may lead individuals to withdraw from social activities, which in turn increases feelings of loneliness and anxiety. Many studies have demonstrated a strong association between RLS symptoms and higher levels of anxiety (7). Depression has also been found to be nearly four times more common in individuals with RLS. RLS may contribute to depressive symptoms as a result of decreased quality of life; however, symptoms such as fatigue and reduced concentration may also be misinterpreted as depression (8).

Although the association between RLS and eating disorders has been investigated less extensively, existing studies suggest a relationship. Individuals with RLS may develop maladaptive eating behaviors as a coping mechanism for emotional distress. Stress caused by RLS may lead some patients to engage in binge eating or irregular eating habits (9). Evidence suggests that RLS has a complex relationship with anxiety, depression, and eating disorders (10). Each of these conditions may trigger or exacerbate the others. Therefore, it is important to consider the psychological status of individuals with RLS and manage them using a multidisciplinary approach.

In our study, we aimed to determine the association between RLS, depression, anxiety, and disordered eating behaviors.

MATERIALS and METHODS

This study was approved by the Sakarya University Faculty of Medicine Clinical Research Ethics Committee (Date: 20.09.2025, Decision No: 464). All procedures were conducted in accordance with ethical standards and the principles of the Helsinki Declaration.

Medical records of 118 patients aged 18-80 who were diagnosed with RLS at our neurology outpatient clinic between September 2024 and October 2025 were reviewed. A total of 46 patients with diabetes mellitus, chronic renal failure, anemia, or malignancy were excluded, and 72 patients were included in the study. Medical data of all patients were retrospectively analyzed. The severity of RLS was recorded using the International Restless Legs Syndrome (IRLS) Rating Scale, consisting of ten face-to-face items scored from 0 to 4. According to the total score, 1-10 indicates mild, 11-20 moderate, 21-30 severe, and 31-40 very severe RLS (11).

Depression, anxiety, and eating behavior assessments were obtained retrospectively from patient files using the Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), and Eating Attitudes Test (EAT-40), respectively. The BDI consists of 21 items scored between 0 and 3, with a total score range of 0-63; higher scores indicate more severe depression. Scores are categorized as follows: 0-9 minimal, 10-16 mild, 17-29 moderate, and 30-63 severe depressive symptoms (12). The BAI assesses anxiety severity using 21 items scored between 0 and 3, yielding a total score of 0-63; higher scores indicate more severe anxiety. Scores between 0-7 indicate minimal, 8-15 mild, 16-25 moderate, and 26-63 severe anxiety (13). The EAT-40, widely used to evaluate disordered eating behaviors, consists of 40 items with responses coded between 1 and 6. Total scores ≥30 indicate a risk for eating disorders (14).

In our study, BDI, BAI, and EAT-40 scores were compared between RLS patients and an age- and sex-matched healthy control group.

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Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, version XX.X (IBM Corp., Armonk, NY, USA). Continuous variables were presented as mean±standard deviation, and categorical variables were expressed as numbers and percentages. The normality of continuous variables was assessed using visual (histograms and Q-Q plots) and analytical methods (Kolmogorov-Smirnov test).

Comparisons between the RLS and control groups were conducted using the independent samples t-test for normally distributed continuous variables and the Mann-Whitney U test for non-normally distributed variables. Categorical variables were compared using the chi-square test or Fisher's exact test, as appropriate.

The relationships between RLS severity, assessed by the International Restless Legs Syndrome Study Group rating scale (IRLS) total score, and psychiatric scale scores (Beck Depression Inventory [BDI], Beck Anxiety Inventory [BAI], and Eating Attitudes Test [EAT-40]) were evaluated using Spearman's rank correlation analysis.

To determine the independent effect of RLS severity on depressive symptoms, a multivariate linear regression analysis was performed with the BDI score as the dependent variable. The IRLS total score was included as the main independent variable, while age and body mass index were entered into the model as potential confounding factors. Model fit was assessed using the coefficient of determination (R^2). A two-tailed p value of <0.05 was considered statistically significant.

RESULTS

A total of 72 patients with Restless Legs Syndrome (RLS) and 44 healthy controls were included in the study. The mean age of the patient group was 43.49±8.67 years, while the mean age of the control group was 41.68±6.53 years. There were no statistically significant differences between the groups in terms of sex distribution or body mass index (BMI) (p > 0.05). The mean IRLS total score in the RLS group was 18.14±8.52.

The Beck Depression Inventory (BDI) score was significantly higher in the RLS group compared with the control group (16.75±9.40 vs. 12.36±6.51; p=0.008). Similarly, the Beck Anxiety Inventory (BAI) score was also significantly higher in patients with RLS than in controls (22.49±13.01 vs. 15.19±8.97; p=0.001). Although the Eating Attitudes Test (EAT-40) score was higher in the RLS group (20.83±10.70 vs. 18.48±11.44), this difference did not reach statistical significance (p=0.267). Nevertheless, the proportion of individuals at risk for eating disorders was higher in the patient group compared with the control group (18.05% vs. 13.64%); however, this difference was not statistically significant.

The demographic and clinical characteristics of the patient and control groups are presented in Table 1.

Table 1. *Demographic and clinical characteristics of the patient and control groups*

Variable	Patients (n=72)	Controls (n=44)	P value
Female sex, n (%)	59 (81.9%)	34 (77.2%)	
Age (years)	43.49±8.67	41.68±6.53	0.237
BMI (kg/m²)	24.83±2.57	24.00±2.13	0.075
Beck Depression Inventory score	16.75±9.40	12.36±6.51	0.008
Beck Anxiety Inventory score	22.49±13.01	15.19±8.97	0.001
Eating Attitudes Test score	20.83±10.70	18.48±11.44	0.267
IRLSSG total score	18.14±8.52	-	-

Among the 72 patients with RLS, the distribution of depression severity showed mild depressive symptoms in 18 patients (25.0%), moderate symptoms in 21 patients (29.16%), and severe symptoms in 11 patients (15.27%). In the control group, mild depressive symptoms were observed in 21 individuals (47.7%), and moderate depressive symptoms in 8 individuals (18.2%).

When anxiety severity was evaluated in the RLS group, 17 patients (23.61%) had mild anxiety, 18 patients (25.0%) had moderate anxiety, and 27 patients (37.5%) had severe anxiety. In the control group, mild anxiety was present in 22 individuals (50.0%), moderate anxiety in 4 individuals (9.1%), and severe anxiety in 4 individuals (9.1%). Data regarding the prevalence of depression, anxiety, and eating disorder risk in the patient and control groups are presented in Table 2.

Table 2. *Distribution of depression and anxiety severity and eating disorder risk in patient and control groups*

	Patients (n=72)	Controls (n=44)
Depression severity		
Normal	22 (30.55%)	15 (34.1%)
Mild	18 (25.0%)	21 (47.7%)
Moderate	21 (29.16%)	8 (18.2%)
Severe	11 (15.27%)	0 (0%)
Anxiety severity		
Normal	10 (13.88%)	14 (31.8%)
Mild	17 (23.61%)	22 (50.0%)
Moderate	18 (25.0%)	4 (9.1%)
Severe	27 (37.5%)	4 (9.1%)
Eating disorder risk		
No	59 (81.95%)	38(86.36%)
Yes	13 (18.05%)	6 (13.64%)

Disease severity in patients with RLS was assessed using the IRLS total score. Strong and positive correlations were found between IRLS scores and BDI ($r=0.86$, $p<0.001$) as well as BAI ($r=0.82$, $p<0.001$). A moderate but statistically significant positive correlation was also observed between IRLS scores and EAT-40 scores ($r=0.41$, $p<0.001$). The results of the correlation analyses are shown in Table 3.

Table 3. *Correlation analysis between RLS Severity (IRLS total score) and psychiatric scales*

Variables	Correlation coefficient (r)	P value
IRLS - Beck Depression Inventory (BDI)	0.86	<0.001
IRLS - Beck Anxiety Inventory (BAI)	0.82	<0.001
IRLS - Eating Attitudes Test (EAT-40)	0.41	<0.001

To evaluate the independent effect of RLS severity on depression, a multivariate linear regression analysis was performed. The IRLS total score was identified as a strong and independent predictor of depressive symptoms ($\beta=0.96$, $p<0.001$), whereas age and body mass index did not make a significant contribution to the model. The regression model explained 74% of the variance in BDI scores. The results of the linear regression analysis for the Beck Depression Inventory are presented in Table 4.

Table 4. *Multivariate linear regression analysis for Beck Depression Inventory*

Variable	β	SE	p
Constant	0.64	3.91	0.870
IRLS total score	0.96	0.07	<0.001
Age (years)	0.01	0.07	0.925
Body mass index (kg/m²)	-0.06	0.12	0.623
Dependent variable: Beck Depression Inventory (BDI) score Model statistics: $R^2=0.74$ | Adjusted $R^2=0.72$ | $F=62.0$ | $p<0.001$			

DISCUSSION

RLS is a common neurological disorder characterized by unpleasant sensations in the legs and an irresistible urge to move them, particularly during rest. Recent reviews have demonstrated that RLS is highly comorbid with psychiatric conditions such as anxiety and depression (15).

In a neuroepidemiological study conducted by Sevim et al. (16) in Mersin, the prevalence of depressive symptoms in individuals with RLS was systematically assessed. The study found that a substantial proportion of participants with RLS exhibited depressive symptoms, and there was a significant positive correlation between RLS severity and depressive symptoms. These findings indicate that RLS is not limited to motor and sensory symptoms but also encompasses psychiatric

dimensions, highlighting the importance of carefully assessing depressive symptoms in clinical evaluations. Similarly, in our study, the RLS group had higher BDI scores, and the severity of depression was significantly greater compared to the control group.

Koo et al. (17), in a large-scale study of elderly male individuals, demonstrated that depressive symptoms significantly increased with RLS severity. In the moderate-to-severe RLS group, the likelihood of depression was approximately three times higher than in individuals without RLS. The authors suggested that this relationship could be partially explained by impaired sleep quality, with disrupted sleep acting as a mediator in the development of depression. In addition, common biological mechanisms, such as dopaminergic dysfunction or alterations in iron metabolism, may also contribute to the development of depression in patients with RLS. Consistently, in our study, depression scores were significantly higher in the patient group compared to controls.

Cho et al. (18), in a population-based cohort study, found that individuals diagnosed with RLS exhibited markedly more severe depressive symptoms. The study evaluated over 2,000 participants, and the RLS group had significantly higher BDI scores compared to controls. The researchers emphasized that RLS is not merely a movement disorder but also exacerbates depressive symptoms via insomnia, daytime fatigue, reduced attention, and impaired social functioning. Furthermore, depression prevalence was observed to increase parallel to RLS severity. The study also suggested that dopaminergic system dysfunction may underlie both RLS and depressive symptoms as a shared pathophysiological mechanism.

In addition to group-based comparisons, our study demonstrated that RLS severity, assessed using the IRLS total score, was strongly associated with psychiatric symptom burden. IRLS scores showed robust positive correlations with both depressive and anxiety symptom severity, indicating that psychiatric manifestations intensify as RLS severity increases. Moreover, in multivariate linear regression analysis, IRLS total score remained an independent predictor of depressive symptom severity even after controlling for potential confounders such as age and body mass index. These findings suggest that the psychiatric burden observed in RLS patients is not merely a secondary phenomenon but is closely linked to disease severity itself. Therefore, assessment of RLS severity may provide clinically meaningful insight into patients at higher risk for significant depressive and anxiety symptoms.

Anxiety disorders are reported to be more prevalent in RLS patients compared to the general population. Winkelmann et al. (19) compared 130 patients with RLS to 2,265 healthy controls and observed an increased prevalence of anxiety disorders in the RLS group. The causal relationship between RLS and anxiety is likely complex and bidirectional, and its etiological mechanisms remain poorly understood. Similarly, in our study, anxiety scores were significantly higher in the RLS group compared to controls.

Sevim et al. (16) further investigated the relationship between RLS and anxiety levels. In their study, 120 RLS patients were compared with 100 age- and sex-matched healthy controls, revealing that Hamilton Anxiety Scale (HAM-A) scores were significantly higher in the RLS group. The authors highlighted that anxiety symptoms are not only a psychological consequence of RLS but also a key factor influencing disease progression. They proposed that dopaminergic dysfunction, increased central nervous system excitability, and chronic sleep deprivation may serve as shared mechanisms underlying both RLS and anxiety. The observed increase in anxiety levels with higher RLS severity supports the possibility of a bidirectional relationship. These findings underscore the importance of psychiatric evaluation and monitoring stress-anxiety levels in the management of RLS. Integrating psychological support and cognitive-behavioral therapies alongside dopaminergic treatments may significantly improve patients' quality of life. Consistently, in our study, anxiety scores in the RLS group were significantly higher than those of the control group.

Several studies have reported a relationship between RLS and nocturnal eating (NE), as well as sleep-related eating disorder (SRED). Provini et al. (20) found that 33% of RLS patients exhibited SRED symptoms, which was significantly higher than in healthy controls. Howell et al. (21) reported that 61% of RLS patients demonstrated NE, and 36% showed SRED, suggesting a potential specific association between RLS and these eating behaviors. Marconi et al. (22) studied primary RLS patients and observed that nocturnal eating behavior was more common and correlated with certain psychopathological features. These findings indicate that RLS is a multidimensional disorder affecting not only motor symptoms but also eating behavior.

Antelmi et al. (23) reported that the prevalence of nocturnal eating behaviors in RLS patients was significantly higher than

in healthy individuals. These behaviors are considered part of the clinical spectrum of RLS and may contribute to increased BMI. While dopaminergic dysfunction plays a central role in RLS pathophysiology, nocturnal eating behaviors may also be linked to this system. This suggests that the relationship between RLS and eating disorders could be explained by dopaminergic system dysfunction, although further research is needed to clarify the nature and mechanisms of this association.

In line with previous literature, our study found that EAT-40 scores were higher in the RLS group compared to controls, and BMI was also higher in patients with RLS. These findings suggest that impulsive or compulsive eating behaviors may contribute to RLS, indicating the need for careful evaluation regarding eating disorders.

Although EAT-40 scores and the prevalence of eating disorder risk were higher in the RLS group, this difference did not reach statistical significance. This finding may be related to the limited sensitivity of the EAT-40 in detecting RLS-specific eating phenotypes, such as nocturnal eating or sleep-related eating behaviors, which have been more strongly associated with RLS in previous studies.

Study Limitations

This study has several limitations that should be acknowledged. First, the retrospective and cross-sectional design limits the ability to draw causal inferences regarding the relationship between RLS severity and psychiatric symptoms. Second, although the sample size was sufficient to demonstrate significant associations, the relatively modest number of participants may limit the generalizability of the findings. Larger, multicenter studies are warranted to confirm these results.

Another limitation concerns the assessment of eating-related behaviors. The Eating Attitudes Test (EAT-40) is a widely used instrument for evaluating general eating attitudes; however, it may not adequately capture RLS-specific eating phenotypes such as nocturnal eating syndrome or sleep-related eating disorder, which have been more closely linked to RLS in previous research. This limitation may partly explain why group differences in eating disorder risk did not reach statistical significance despite a positive association between RLS severity and EAT-40 scores.

Finally, although major demographic variables such as age and body mass index were controlled for in multivariate analyses, other potential confounding factors, including sleep quality, disease duration, medication use, and comorbid medical conditions, could not be fully accounted for and should be considered in future prospective studies.

CONCLUSION

In conclusion, our study demonstrates that individuals with RLS exhibit significantly higher depression and anxiety levels compared to healthy controls, highlighting psychiatric morbidity as an important component in this population. The shift toward more severe depression and anxiety in the RLS group supports the view that the neuropsychiatric aspects of the disorder should not be overlooked in clinical management. Although EAT-40 scores and the risk of eating disorders were higher in the patient group, these differences were not statistically significant. Integrating psychological assessment into the follow-up and treatment of RLS is crucial for maintaining overall well-being. Further studies with larger sample sizes are warranted to better elucidate causal relationships and underlying pathophysiological mechanisms.

Ethics: This study was approved by the Sakarya University Faculty of Medicine Clinical Research Ethics Committee (date: 20.09.2025, decision no: 464).

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