NÖRO PSİKİYATRİ ARŞİVİ
ARCHIVES OF NEUROPSYCHIATRY

RESEARCH ARTICLE

Article No: 42

Arch Neuropsychiatry 2026;63:270–276
https://doi.org/10.29399/npa.29153

The Relationship Between Sleep Quality and Prodromal Symptoms in Euthymic Patients with Bipolar Disorder

Yağmur Sever FİDAN[1], Filiz İZCİ[1], Metin ASLAN[1], Sümeyye Yasemin ÇALLI[1], Mehmet Akif ŞAKİROGLU[1], Barış PİRE[1], Arda KIZILSERT[1]

[1]University of Health Sciences, Faculty of Medicine, Department of Psychiatry, Erenkoy Mental and Nervous Diseases Training and Research Hospital, Istanbul, Türkiye

ABSTRACT

Introduction: Although sleep quality is known to be impaired in individuals diagnosed with bipolar disorder (BD) during manic, depressive, and even euthymic phases, limited research has explored its association with prodromal symptoms. This study aims to investigate the relationship between sleep quality and the frequency and severity of prodromal symptoms in patients diagnosed with bipolar disorder during euthymic periods.

Methods: The study included 98 patients with euthymic BD in remission. The participants completed the sociodemographic data form, Pittsburgh Sleep Quality Index (PSQI), Bipolar Prodrome Symptom Scale (BPSS), Young Mania Rating Scale (YMRS), and Hamilton Depression Rating Scale (HDRS).

Results: The mean age of the patients was 42.20 ± 11.902. In the patient group with PSQI score>5, BPSS-frequency and BPSS-severity scores were found to be significantly higher ($p<0.05$). Both BPSS-frequency and severity scores showed significant positive correlations with PSQI scores ($p<0.001$), and BPSS-frequency score was positively correlated with HDRS scores ($p<0.05$). No significant differences were observed in BPSS, HDRS, or YMRS scores according to the duration of the disorder ($p>0.05$).

Conclusion: Based on the findings of our study, we conclude that as sleep quality deteriorates during the euthymic phase in patients with BD, the frequency and severity of prodromal symptoms also increase. It is suggested that sleep disturbances in this patient population should be closely monitored even during the euthymic period, as sleep disorders themselves may serve as prodromal symptoms and potentially exacerbate the onset of other prodromal manifestations. Therefore, detailed assessment of sleep problems between episodes—and timely intervention when necessary—may be critical for early detection and prevention of mood episode relapse.

Keywords: Bipolar disorder, early warning signs, euthymia, prodromal symptoms, sleep disturbance, sleep hygiene

Cite this article as: Fidan YS, İzci F, Aslan M, Çallı SY, Şakiroğlu MA, Pire B et al. The Relationship Between Sleep Quality and Prodromal Symptoms in Euthymic Patients with Bipolar Disorder. Arch Neuropsychiatry 2026;63:270–276. doi: 10.29399/npa.29153

INTRODUCTION

Recurrent episodes are observed in approximately 90% of individuals diagnosed with bipolar disorder (BD). One of the most important factors affecting the prognosis of the disorder is recurrence of these episodes. Therefore, early detection and identification of episodes are critical for improving long-term outcomes (1).

Prodromal symptoms may emerge weeks or even months before the onset of a mood episode. Recognizing of these prodromal symptoms is crucial for developing effective clinical strategies aimed at preventing relapse (2). The importance of screening and recognition of prodromal symptoms has been emphasized in numerous studies as s they may predict the onset of depressive or (hypo)manic episodes in BD. There are clinical studies showing that sleep disorders are particularly valuable in determining the development of a depressive episodes (3-5).

Sleep disturbances are common during acute episodes of BD as well as during remission in both young and adults (6). Poor sleep quality, difficulty falling asleep and staying asleep, altered total sleep duration, daytime sleepiness and nightmares are commonly reported sleep complaints among patients with BD (7, 8).

Highlights

- **Euthymic sleep problems associate with frequent and severe prodromal symptoms.**
- **Poor sleep quality correlates with higher depressive scores in remission phase.**
- **Monitoring sleep disturbances in remission may aid in preventing relapses.**

Correspondence Address: Yağmur Sever Fidan, Erenköy Mental Health and Diseases Training and Research Hospital. Erenkoy/Istanbul, Türkiye • **E-mail:** dr.yagmurfidan@gmail.com
Received: 14.05.2025, **Accepted:** 12.08.2025, **Available Online Date:** 05.11.2025

The negative impact of sleep disturbances on quality of life, emotional and cognitive functioning, impulsivity and general health is well documented (6). Sleep disturbance occurs even in euthymic episodes of BD, so it is thought that sleep disturbance and BD may share a similar etiology or overlapping pathophysiology and that BD patients may have a genetic predisposition that may take the form of circadian rhythm instability (7, 8). There is growing interest in investigating sleep and circadian markers as potential determinants of mood episodes in BD. These markers hold promise for identifying imminent mood episodes (2). In one study, prodromal symptoms of mania were identified more frequently than early symptoms of depression. Sleep disturbances, in particular, have emerged as the most prominent prodromal symptom for manic episodes, reported by 77% of individuals (9). Another study found that 15% of patients who had recovered from a mood episode continued to experience sleep disturbance. The occurrence of sleep disturbances was associated with an increased risk of subsequent mood episode relapse (10). The recovery phase following a mood episode in bipolar disorder may increase vulnerability to future relapses, and sleep disturbances during this period may serve as early prodromal indicators of an impending episode (2). Similarly; A study conducted in 2016 found that poor sleep quality in recovered BD patients was associated with earlier recurrence of mood episodes, regardless of residual mood symptoms (11). The identification and treatment of prodromal symptoms such as sleep disturbance may reduce the duration of untreated disease, which has been associated with worse outcomes, greater relapse rates, and reduced social functioning (10, 11).

Although it is well established that sleep quality in patients with BD is affected during the manic, depressive and even euthymic periods of the disorder, limited research has examined its association with prodromal symptoms. The aim of our study is to investigate the sleep disturbances of euthymic patients in remission, to evaluate the impact of the frequency and severity of prodromal symptoms on sleep quality, and to provide a basis for future studies in this area. We hypothesized that a) individuals with poorer sleep quality would experience more frequent and severe prodromal symptoms during euthymia; b) those with lower sleep quality would report higher depressive symptom scores even during remission; and c) disorder duration may influence the relationship between sleep quality and prodromal symptoms.

METHODS

Study Design

Our study was designed as a cross-sectional and descriptive study. Data were collected between January 1, 2023, and December 31, 2023. The sample consisted of literate individuals aged 18 to 65 years who had been diagnosed with bipolar disorder (BD) and were in the euthymic (remission) phase. The diagnosis of bipolar disorder was made by a trained psychiatrist based on the DSM-5 diagnostic criteria through routine clinical evaluation.

In accordance with commonly used definitions in the literature (12, 13), euthymia was defined based on patient self-report, clinical impression, a Young Mania Rating Scale (YMRS) score of <12, and a Hamilton Depression Rating Scale (HDRS) score of <7, with the euthymic state maintained for at least 8 weeks. In addition, only outpatients were included in the study.

Individuals with intellectual disability, autoimmune diseases, diabetes, epilepsy, cardiovascular diseases, endocrine, renal, hepatic, pulmonary, neurological diseases, malignancies, substance or alcohol use disorders, or any additional psychiatric diagnosis other than bipolar disorder were excluded from the study. Patients who met the inclusion criteria were informed both verbally and in writing, and written informed consent was obtained.

The study was reviewed and approved by the Erenkoy Mental and Nervous Diseases Training and Research Hospital Scientific Research Ethics Committee (Date: 30.12.2022; No: 61). All participants completed the Sociodemographic Data Form, the Pittsburgh Sleep Quality Index (PSQI), the Bipolar Prodrome Symptom Scale (BPSS), the Young Mania Rating Scale (YMRS), and the Hamilton Depression Rating Scale (HDRS).

Additionally, as stated in the ethics committee approval, the study aimed to include all patients diagnosed with bipolar disorder who presented to the outpatient clinic between 01.01.2023 and 31.12.2023 and were determined to be in a euthymic phase. Accordingly, 98 individuals who agreed to participate in the study were included. Although a priori power analysis was not conducted, a post hoc analysis using G*Power software (version 3.1.9.7) indicated that this sample size was sufficient to detect a medium effect size with statistical significance. Specifically, based on the observed correlation between BPSS-F and total PSQI scores ($r = 0.384$, $n = 98$), the statistical power ($1-\beta$) of the study was calculated to be approximately 99%.

Data Collection Tools

Sociodemographic data form: A data form that was created for the study and includes sociodemographic information and clinical information such as the number of hospitalizations, age of onset, and duration of disorder was used.

Young Mania Rating Scale (YMRS): It is a Likert-type scale developed to measure the severity of manic symptoms. 7 of the 11 items are rated between 0-4, and the other 4 items are rated between 0-8. The total scale score of 23 is determined by the sum of all items (14). The Turkish validity and reliability study was conducted by Karadağ et al. (15).

Hamilton Depression Rating Scale (HDRS): The Hamilton Depression Scale was developed by Max Hamilton to assess the severity of depression (16). Its Turkish validity and reliability were conducted by Akdemir et al. (17). Although new types of the scale, which was developed as a 17-item scale, were prepared with 21 and 24 items in the following years, the first 17-item type was used in our study. It is a three- and five-point Likert-type scale. The scale has subgroups such as depressed mood, suicidal ideation, appetite, weight loss, insomnia, agitation, anxiety, hypochondriac symptoms, retardation, gastrointestinal system symptoms, somatic symptoms and insight.

Bipolar Prodrome Symptom Scale (BPSS): It is a screening form that evaluates the severity and frequency of hypomanic symptoms seen in the last year. Its translation into Turkish, validity and reliability study was conducted by Aydemir et al. in 2016 (18). The scale, consisting of 14 items, rates the severity and frequency of hypomanic symptoms in the range of 0-5 points. It has been shown to have sufficient psychometric properties in screening hypomanic symptoms. The BPSS-frequency subscale (BPSS-F) assesses how often each symptom has occurred within the last 12 months. Scores range from 0 ("never") to 5 ("almost always"), reflecting the regularity or recurrence of each symptom. The BPSS-severity subscale (BPSS-S), on the other hand, measures the intensity or impact of each symptom when present. It is also scored from 0 ("not at all severe") to 5 ("extremely severe"), indicating the degree to which the symptom interferes with functioning or causes distress.

Van Meter et al. (2019) showed that the first 11 items, especially in the calculation of the total score, have useful properties in community screening (19).

Pittsburgh Sleep Quality Index (PSQI): PSQI was prepared by Buysse et al. in 1989. The validity and reliability study in our country was conducted by Ağargün et al. in 1996 (20). It is a questionnaire that evaluates sleep

quality with questions asked under seven main headings that evaluate subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disorders, use of sleeping pills and daytime dysfunction. Participants are asked to answer the questions by taking into account their sleep habits in the last month. According to the participants' answers, each of the seven main headings is first evaluated within itself and receives a score between 0-3. High scores indicate poor sleep quality. Then, the scores of the seven components are added. The total score of the scale is between 0-21. If the total score is 5 and above, sleep quality is evaluated as poor. The diagnostic sensitivity of the PSQI is 89.6% and its specificity is 86.5% (21). In the study, participants with a PSQI total score above 5 were classified as the "poor sleep quality group", while those with a score of 5 or below were considered the "normal sleep quality group".

All assessment scales were administered by an experienced psychiatrist. The self-report-based instruments, namely the Pittsburgh Sleep Quality Index (PSQI) and the Bipolar Prodrome Symptom Scale (BPSS), were completed by the patients under the supervision of the psychiatrist. The Young Mania Rating Scale (YMRS) and the Hamilton Depression Rating Scale (HDRS) were evaluated by the psychiatrist based on clinical observation through semi-structured interviews.

Statistical Analysis

Statistical analysis was performed using IBM SPSS Statistics version 26. For continuous variables with normal distribution, mean and standard deviation were calculated; for non-normally distributed continuous variables, median and interquartile range (Q1–Q3) were reported. Categorical variables were summarized using frequencies and percentages.

Normality of distribution was assessed using the Kolmogorov–Smirnov test. For comparisons between two independent groups, the independent samples t-test was used for normally distributed data, and the Mann–Whitney U test for non-normally distributed data. Categorical variables were compared using the chi-square test or Fisher's exact test, as appropriate. For comparisons involving more than two groups, the Kruskal–Wallis H test was used, followed by Bonferroni-adjusted Mann–Whitney U tests for post hoc analyses ($p < 0.05/3 = 0.017$).

Correlation analyses were performed using Pearson's correlation test for normally distributed variables and Spearman's rank correlation test for non-normally distributed variables. A two-tailed p-value of <0.05 was considered statistically significant.

RESULTS

Sociodemographic and Clinical Characteristics of Patients

A total of 98 patients diagnosed with BD were included in the study. The mean age of the participants was 42.20 ± 11.90. In terms of gender distribution, female participants were represented at 53.1% (n=52) and male participants at 46.9% (n=46). (Table 1)

The sociodemographic and clinical characteristics of the participants are presented in Table 1.

Scale score averages of patients

The mean scores of the assessment scales used in the study are presented in Table 2. These scores indicate that participants were, on average, in the euthymic phase with minimal depressive and manic symptoms (YMRS = 1.30 ± 2.316; HDRS = 3.67 ± 4.842). However, the mean PSQI score of 6.15 ± 3.743 suggests that a substantial portion of the sample consisted of poor sleepers. The average scores of BPSS-S (18.03 ± 15.292) and BPSS-F (15.09 ± 12.963) further indicate that prodromal symptoms—both in frequency and severity—were still present in many poor sleepers, even during the euthymic phase.

Correlation analysis of patients' scale scores

A strong and statistically significant positive correlation was found between BPSS-S and BPSS-F scores (r= 0.760, p< 0.001). BPSS-S was also weakly but significantly correlated with PSQI total scores (r= 0.332, p = 0.001). Similarly, BPSS-F showed a weak and statistically significant positive correlation with PSQI scores (r= 0.384, p< 0.001), and a weak correlation with HDRS scores (r= 0.353, p= 0.006). In addition, a weak but statistically significant correlation was found between HDRS and YMRS scores (r = 0.277, p = 0.032). No statistically significant correlations were observed between YMRS and PSQI, or between HDRS and PSQI (p> 0.05 for both) (Table 3).

Scale score averages of patients with PSQI scores ≤5 and >5

BPSS-S scores were determined as 12.97 ± 14.008 in normal sleep quality group (ie PSQI≤5), and 21.37 ± 15.296 in poor sleep quality group (ie PSQI>5). Normal sleep quality group had a statistically lower BPSS-S score than the poor sleep quality group (t = 2.750, p = 0.007) (Table 4).

Table 1. Sociodemographic and Clinical Characteristics of Patients

	n	%
Age (years), Mean ± SD	–	42.20 ± 11.90
Age at Disorder Onset, Mean ± SD	–	26.94 ± 8.61
Number of Hospitalizations, Mean ± SD	–	1.55 ± 2.63
Sex		
Female	52	53.1
Male	46	46.9
Marital Status		
Married	54	55.1
Single	31	31.6
Divorced	13	13.3
Occupational Status		
Unemployed	37	37.8
Public Officer	10	10.2
Worker	26	26.5
Retired	25	25.5
Education Level		
Primary School	42	42.9
High School	32	32.7
University	24	24.5
Smoking Status		
Non-smoker	42	42.8
Smoker	56	57.2
Alcohol Use		
No	84	85.7
Yes	14	14.3
History of Suicide Attempt		
No	85	86.7
Yes	13	13.3
Duration of Disorder (years)		
<5	8	8.2
5–10	13	13.3
>10	77	78.6
Family History of Psychiatric Disorder		
No	65	66.3
Yes	33	33.7

Table 2. Mean scale scores of patients

Scales	Mean / Std. deviation
BPSS-S	18.03 ± 15.292
BPSS-F	15.09 ± 12.963
HDRS	3.67 ± 4.842
YMRS	1.30 ± 2.316
PSQI	6.15 ± 3.743

PSQI: Pittsburgh Sleep Quality Index, BPSS-S: Bipolar Prodrome Symptom Scale -Severity, BPSS-F: Bipolar Prodrome Symptom Scale -Frequency, YMRS: Young Mania Rating Scale, HDRS: Hamilton Depression Rating Scale

BPSS-F scores were determined as 10.21 ± 9.674 in normal sleep quality group, and 18.32 ± 13.894 in poor sleep quality group. Normal sleep quality group had a statistically lower BPSS-F score than poor sleep quality group (t = 3.173, p = 0.001). (Table 4)

HDRS scores were 2.41 ± 3.029 in normal sleep quality group while they were 4.70 ± 5.774 in poor sleep quality group. No statistically significant difference was found in terms of HDRS in both groups (t = 1.970, p=0.054). (Table 4)

YMRS scores were 1.30 ± 2.383 in normal sleep quality group, while they were 1.30 ± 2.298 in poor sleep quality group. No statistically significant difference was found in terms of YMRS scores in both groups (p>0.05). (Table 4)

Average of scale scores according to duration of disorder

No statistically significant differences were found in PSQI, BPSS-S, or BPSS-F scores across patients grouped by disorder duration (<5 years, 5–10 years, >10 years) (p>0.05 for all comparisons) (Table 5). YMRS and HDRS scores were not included in Table 5, and thus could not be evaluated in relation to disorder duration in this analysis.

Regression Analyses

Multiple regression analyses were conducted to understand the direction of the relationship between sleep quality and BPSS-F, which showed a strong correlation, and sleep quality and BPSS-S, which showed a weak correlation.

As a result of these analyses, no significant predictor was found in the model when PSQI was taken as the dependent variable. When BPSS-F was taken as the dependent variable, PSQI (β=0.294, p=0.041), and disease duration (β=0.542, p=0.008) were identified as significant predictors (R^2=0.683, p=0.003). In the model where BPSS-S was the dependent variable, the only predictor was BPSS-F (β=0.807, p<0.001) (R^2=0.640, p<0.001).

None of the clinical correlates selected as independent variables in these models, such as age, marital status, gender, occupation, education, alcohol and substance use, and family history, were found to be significant predictors (all p>0.05).

Table 3. Correlation analysis between patients' scale scores

		BPSS-S	BPSS-F	HDRS	YMRS	TOTAL -PSQI
BPSS-S	Pearson Correlation	1	0.760**	0.146	0.071	0.332**
	p		0.000	0.266	0.592	0.001
BPSS-F	Pearson Correlation		1	0.353**	0.181	0.384**
	p			0.006	0.167	0.001
HDRS	Pearson Correlation			1	0.277*	0.187
	p				0.032	0.157
YMRS	Pearson Correlation				1	0.041
	p					0.755
TOTAL- PSQI	Pearson Correlation					1
	p					

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
PSQI: Pittsburgh Sleep Quality Index, BPSS-S: Bipolar Prodrome Symptom Scale -Severity, BPSS-F: Bipolar Prodrome Symptom Scale -Frequency, YMRS: Young Mania Rating Scale, HDRS: Hamilton Depression Rating Scale
Note: Pearson correlation test was used.

Table 4. Scale score averages of patients with poor and normal sleep quality

	Normal sleep quality group (Mean / Std. deviation)	Poor sleep quality group (Mean / Std. deviation)	t	p
BPSS-S	12.97 ± 14.008	21.37 ± 15.296	2.750	0.007*
BPSS-F	10.21 ± 9.674	18.32 ± 13.894	3.173	0.001*
HDRS	2.41 ± 3.029	4.70 ± 5.774	1.970	0.054
YMRS	1.30 ± 2.383	1.30 ± 2.298	0.011	0.991

*p<0.05
Poor sleep quality group PSQI>5; Normal sleep quality group PSQI≤5
PSQI: Pittsburgh Sleep Quality Index, BPSS-S: Bipolar Prodrome Symptom Scale -Severity, BPSS-F: Bipolar Prodrome Symptom Scale -Frequency, YMRS: Young Mania Rating Scale, HDRS: Hamilton Depression Rating Scale

Table 5. Mean scale scores according to disorder duration

Disorder Duration	<5 year	5-10 year	>10 year	p
PSQI	5.25 ± 3.576	4.46 ± 2.332	6.54 ± 3.890	0.161
BPSS-S	22.13 ± 11.581	20.85 ± 20.892	17.13 ± 14.603	0.467
BPSS-F	24.63 ± 14.775	13.0 ± 12.186	14.45 ± 12.659	0.088

PSQI: Pittsburgh Sleep Quality Index, BPSS-S: Bipolar Prodrome Symptom Scale -Severity, BPSS-F: Bipolar Prodrome Symptom Scale -Frequency

DISCUSSION

In our study, we found that decreased sleep quality in euthymic patients with BD was associated with increased frequency and severity of prodromal symptoms. While it remains unclear whether poor sleep quality is itself a prodromal symptom or a contributing factor (10, 11), our findings highlight its clinical relevance even during remission. Supporting this, a previous study reported that 59% of BD patients spontaneously noted sleep disturbances before the onset of mood episodes; this rate increased to 83% when specific questions were asked, suggesting that sleep disruptions may often go unrecognized. In the same study, sleep disturbances were observed with similar frequency prior to both depressive and manic episodes, although excessive sleepiness was significantly more common before depressive episodes than manic ones (2).

In our sample, participants with poor sleep quality exhibited higher levels of depressive and manic symptoms, as well as increased frequency and severity of prodromal features. The incidence of sleep disorders during depression and mania periods is reported to be over 60% (22). While prevalence estimates vary widely—from 10% to 80%—this variability is largely attributable to methodological differences and inconsistencies in defining sleep problems (23). Consistent with our findings, previous research has shown that patients with BD exhibit significantly impaired sleep quality even during euthymic periods (24). In our study, although all patients were in remission, the mean PSQI score was 6.15 ± 3.743, indicating overall impaired sleep quality.

Poor sleep quality in BD has been associated with greater symptom severity, poor prognosis, and elevated relapse risk (10, 25, 26). Baseline sleep impairment has also been shown to predict the frequency and intensity of depressive, manic, and mixed episodes (27). As such, sleep disturbances are increasingly recognized as clinically meaningful symptoms of BD and important therapeutic targets. In line with this, our findings demonstrated a weak but significant association between sleep quality and both the frequency and severity of prodromal symptoms.

Severe sleep disturbances in BD have been associated with significantly reduced quality of life (28, 29). One study found a statistically significant correlation between sleep quality and quality of life, suggesting that poor sleep may directly impair overall well-being in individuals with BD. Moreover, sleep disturbances have been closely linked to interepisodic dysfunction and symptom exacerbation (30), and have been identified as multifactorial contributors to adverse health outcomes and relapse (26).

In our study, when disease duration was categorized as less than 5 years, 5–10 years, and more than 10 years, we found no statistically significant differences in sleep quality, prodromal symptom frequency or severity, or depression and mania scores across groups. This may be attributed to the fact that all participants were in the euthymic phase at the time of assessment, and that the majority (78.6%) had been living with the disorder for more than a decade, possibly reducing intergroup variability.

The high prevalence of sleep disturbances preceding mood episodes in BD suggests distinct prodromal patterns between depressive and manic phases. In one study, 59% of patients reported experiencing sleep problems approximately 90 days prior to depressive episodes and 35 days prior to manic episodes. These durations were found to be even longer when detailed, structured sleep-related questions were used (9). Another study that tracked BD symptoms over a six-month period found that shorter sleep duration, as measured by the PSQI sleep component, predicted an increase in depressive symptoms—but not manic symptoms (31).

A systematic review on prodromal symptoms in BD and unipolar depression reported that over 80% of patients could identify early warning signs. Among patients with BD, sleep disturbance was identified as the most common prodrome of mania and the sixth most common prodrome of depression. Prodromal symptoms of mania were more frequently recognized than those of depression, with sleep disturbance being the most prominent early symptom of mania (median prevalence: 77%). While the average duration of manic prodromes exceeded 20 days, depressive prodromes were generally shorter (less than 19 days) but exhibited greater interindividual variability—ranging from 2 to 365 days for depression and 1 to 120 days for mania (9). I n our study, although the sample was in the euthymic phase, a relationship was found between depression scores and the frequency of prodromal symptoms; depression scores were higher in the group with poor sleep quality.

In our study, although the sample group was in the euthymic period, depression scores were found to be associated with the frequency of prodromal symptoms. Depression scores were found to be higher in the group with poor sleep quality. Although this difference did not reach conventional levels of statistical significance ($p = 0.054$), it may indicate a trend-level association, suggesting that subclinical depressive symptoms might coincide with or contribute to early warning signs during remission. This interpretation is consistent with recent findings that emphasize the persistence of residual depressive symptoms during euthymia and their association with poor sleep quality and relapse risk in BD (32, 33).

The findings obtained from the regression analyses support the correlation-based results of our study. The absence of a significant predictor in the model where sleep quality (as measured by PSQI) was taken as the dependent variable may reflect the multidimensional nature of this construct and the considerable interindividual variability. On the other hand, in the model predicting the frequency of prodromal symptoms, both sleep quality and disorder duration emerged as significant predictors. This finding suggests that sleep quality may not merely be an accompanying symptom but could also be associated with the overall pattern of prodromal features. Indeed, previous studies have shown that poor sleep quality is related to prodromal symptoms not only during acute episodes but also in the euthymic phase (2, 34).

The positive association between disorder duration and the frequency of prodromal symptoms may indicate that prodromal symptoms intensify on a neurobiological level over time, or that individuals become more adept

at recognizing these symptoms as the disorder progresses. Furthermore, the fact that the severity of prodromal symptoms was significantly predicted solely by their frequency suggests that these two constructs are closely interrelated and likely reflect overlapping processes. Taken together, these findings indicate that impaired sleep quality is associated with prodromal symptoms even during remission, highlighting the importance of systematically assessing sleep quality during the euthymic phase of bipolar disorder as part of clinical monitoring and intervention planning.

This study has several limitations. Due to its cross-sectional design, causal relationships cannot be inferred. The sample may not represent the broader bipolar disorder population, and self-reported data may introduce bias. Participants may also have had difficulty accurately recalling past symptoms and sleep patterns. Although only euthymic patients were included, certain clinical features from past episodes (e.g., mixed features, rapid cycling, psychotic symptoms) were not systematically assessed. Additionally, important factors affecting sleep quality—such as timing of nicotine and caffeine use, body mass index, and type or duration of psychotropic medications—were not evaluated in detail. Although patients with psychiatric comorbidities were excluded from the study, psychotropic medication use (type, dosage, combination, and indication) was not systematically assessed or controlled for, which may have influenced the findings. Therefore, the potential influence of these variables cannot be excluded. Future studies should account for these variables to better isolate the effect of sleep on prodromal features.

According to the results of our study; as sleep quality deteriorates, bipolar prodrome frequency and severity scores increase. It is observed that prodromal scale scores increase significantly, especially when PSQI scores are over 5. In addition, a relationship was found between depressive symptom severity and the frequency of prodromal symptoms. These findings highlight the importance of recognizing and addressing sleep problems even when individuals with BD appear to be in remission. Poor sleep quality during the euthymic phase may not simply be a residual symptom—it could signal the early stages of a new episode and contribute to the intensification of other prodromal signs. For this reason, careful monitoring of sleep patterns and timely, targeted interventions may play a key role in preventing relapse.

Considering the strength of these associations, sleep disturbances may offer valuable clinical insights as early warning signs of mood episode onset. Ongoing, long-term research is essential to deepen our understanding of this relationship and to guide more effective, proactive care strategies for individuals living with BD. To support this, objective sleep measures like polysomnography could offer clearer insights than self-report measurements. Additionally, examining sleep alongside biological rhythms may help identify early warning signs of relapse.

Ethics Committee Approval: The study was ethically evaluated and approved by the Erenkoy Mental and Nervous Diseases Training and Research Hospital Scientific Research Ethics Committee (Date: 30.12.2022; No: 61).

Informed Consent: Written informed written consent was obtained from all participants prior to their participation in the study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept- YSF, Fİ, MA, AK; Design- YSF, Fİ, MA, AK; Supervision- YSF, Fİ; Data Collection and/or Processing- YSF, Fİ, BP, MAŞ, SYÇ; Analysis and/or Interpretation- YSF, Fİ, MA, BP; Literature Search- YSF, Fİ, MA, AK, SYÇ; Writing- YSF, Fİ, MA; Critical Reviews- Fİ.

Conflict of Interest: The authors declared that there is no conflict of interest.

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

REFERENCES

1. Perlis RH, Ostacher MJ, Patel JK, Nierenberg AA, Calabrese JR, Marangell LB, et al. Predictors of recurrence in bipolar disorder: primary outcomes from the systematic treatment enhancement program for bipolar disorder (STEP-BD). Am J Psychiatry. 2006;163(2):217–224. [Crossref]
2. Basquin L, Maruani J, Leseur J, Bailly L, Hardy P, Falissard B, et al. Study of the different sleep disturbances during the prodromal phase of depression and mania in bipolar disorders. Bipolar Disord. 2024;26(5):454–467. [Crossref]
3. Guo T, Yang Y, Zhao Q, Wang J, Guo W, Wang Y, et al. Prodromal symptoms of Chinese patients with bipolar disorder. J Affect Disord. 2021;294:908–915. [Crossref]
4. Zeschel E, Correll CU, Haussleiter IS, Pfennig A, Bauer M, Severus E, et al. The bipolar disorder prodrome revisited: Is there a symptomatic pattern? J Affect Disord. 2013;151(2):551–560. [Crossref]
5. Hafeman DM, Merranko J, Axelson D, Goldstein B, Goldstein T, Monk K, et al. Toward the definition of a bipolar prodrome: dimensional predictors of bipolar spectrum disorders in at-risk youths. Am J Psychiatry. 2016;173(7):695–704. [Crossref]
6. Harvey AG, Soehner AM, Kaplan KA, Hein K, Lee J, Kanady J, et al. Treating insomnia improves mood state, sleep, and functioning in bipolar disorder: a pilot randomized controlled trial. J Consult Clin Psychol. 2015;83(3):564–577. [Crossref]
7. Keskin N, Tamam L, Ozpoyraz N. Assessment of sleep quality in bipolar euthymic patients. Compr Psychiatry. 2018;80:116–125. [Crossref]
8. Plante DT, Winkelman JW. Sleep disturbance in bipolar disorder: therapeutic implications. Am J Psychiatry. 2008;165(7):830–843. [Crossref]
9. Jackson A, Cavanagh J, Scott J. A systematic review of manic and depressive prodromes. J Affect Disord. 2003;74(3):209–217. [Crossref]
10. Sylvia LG, Dupuy JM, Ostacher MJ, Baek JH, Shelton RC, Ketter TA, et al. Sleep disturbance in euthymic bipolar patients. J Psychopharmacol. 2012;26(8):1108–1112. [Crossref]
11. Cretu JB, Culver JL, Goffin KC, Shah S, Ketter TA, Nierenberg AA, et al. Sleep, residual mood symptoms, and time to relapse in recovered patients with bipolar disorder. J Affect Disord. 2016;190:162–166. [Crossref]
14. Young RC, Biggs JT, Ziegler VE, Meyer DA. A rating scale for mania: reliability, validity and sensitivity. Br J Psychiatry. 1978;133:429–435. [Crossref]
15. Karadağ F, Oral ET, Aran Yalçın F, Erten E. Young Mani Derecelendirme Ölçeği'nin Türkiye'de geçerlik ve güvenilirliği. Turk Psikiyatri Derg. 2001;13(2):107–114.
16. Hamilton M. A rating scale for depression. J Neurol Neurosurg Psychiatry. 1960;23:56–62. [Crossref]
17. Akdemir A, Örsel S, Dağ İ, Türkcapar H, İşcan N, Ozbay H. Hamilton Depresyon Derecelendirme Ölçeği (HDDÖ)'nin geçerliği, güvenirliği ve klinikte kullanımı. 3P Derg. 1996;4(4):251–259.
18. Aydemir Ö, Öztekin S, Akdeniz F. Reliability and validity study of the Turkish version of Bipolar Prodrome Symptom Scale. Turk Psikiyatri Derg. 2018;29(2):116–121. [Crossref]
19. Van Meter A, Guinart D, Bashir A, Lucksted A, Sajatovic M, Bauer M, et al. Bipolar Prodrome Symptom Scale -abbreviated screen for patients: description and validation. J Affect Disord. 2019;249:357–365. [Crossref]
20. Ağargün MY, Kara H, Anlar O. Pittsburgh Uyku Kalitesi İndeksinin geçerliği ve güvenirliği. Turk Psikiyatri Derg. 1996;7(2):107–115.
21. Buysse DJ, Hall ML, Strollo PJ, Kamarck TW, Owens J, Lee L, et al. Relationships between the Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), and clinical/polysomnographic measures in a community sample. J Clin Sleep Med. 2008;4(6):563–571. [Crossref]
22. Gold AK, Sylvia LG. The role of sleep in bipolar disorder. Nat Sci Sleep. 2016;8:207–214. [Crossref]
23. Steinan MK, Scott J, Lagerberg TV, Morken G, Sundet K, Andreassen OA, et al. Sleep problems in bipolar disorders: more than just insomnia. Acta Psychiatr Scand. 2016;133(5):368–377. [Crossref]
24. Rahimi A, Ahmadpanah M, Shamsaei F, Cheraghi F, Sadeghi Bahmani D, Holsboer-Trachsler E, et al. Effect of adjuvant sleep hygiene psychoeducation and lorazepam on depression and sleep quality in patients with major depressive disorders: results from a randomized three-arm intervention. Neuropsychiatr Dis Treat. 2016;12:1507–1515. [Crossref]
25. Gruber J, Miklowitz DJ, Harvey AG, Frank E, Kupfer D, Thase ME, et al. Sleep matters: sleep functioning and course of illness in bipolar disorder. J Affect Disord. 2011;134(1-3):416–420. [Crossref]
26. Harvey AG, Talbot LS, Gershon A. Sleep disturbance in bipolar disorder across the lifespan. Clin Psychol (New York). 2009;16(2):256–277. [Crossref]

27. Saunders EFH, Fernandez-Mendoza J, Kamali M, Kalali A, McInnis MG. The effect of poor sleep quality on mood outcome differs between men and women: a longitudinal study of bipolar disorder. J Affect Disord. 2015;180:90–96. [Crossref]
28. Sariarslan HA, Gulhan YB, Unalan D, Basturk D, Yildiz S. The relationship of sleep problems to life quality and depression. Neurosciences (Riyadh). 2015;20(3):236–242. [Crossref]
29. Palhares VC, Corrente JE, Matsubara BB. Association between sleep quality and quality of life in nursing professionals working rotating shifts. Rev Saude Publica. 2014;48(4):594–601. [Crossref]
30. Shamsaei F, Yadollahifar S, Sadeghi A. Relationship between sleep quality and quality of life in patients with bipolar disorder. Sleep Sci. 2020;13(1):65–69.
31. Perlman CA, Johnson SL, Mellman TA. The prospective impact of sleep duration on depression and mania. Bipolar Disord. 2006;8:271–274. [Crossref]
32. Ulrichsen A, Tröger A, Jauhar S, Severus E, Bauer M, Cleare A. Do sleep variables predict mood in bipolar disorder: a systematic review. J Affect Disord. 2025;373:364–373. [Crossref]
33. Tonon AC, Nexha A, Mendonça da Silva M, Gomes FA, Hidalgo MP, Frey BN. Sleep and circadian disruption in bipolar disorders: from psychopathology to digital phenotyping in clinical practice. Psychiatry Clin Neurosci. 2024;78(11):654–666. [Crossref]
34. Ng TH, Chung KF, Ho FY, Yeung WF, Yung KP, Lam TH. Sleep-wake disturbance in interepisode bipolar disorder and high-risk individuals: a systematic review and meta-analysis. Sleep Med Rev. 2015;20:46–58. [Crossref]