Sleep Quality and Quality of Life in Remitted Bipolar Disorder Patients: A Cross-sectional Comparative Study

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ABSTRACT

Background: Patients diagnosed with bipolar disorder often have sleep-related problems, even when not in an episode. Poor sleep quality may be related to poor quality of life. The objective of this study was to evaluate sleep quality in remitted bipolar patients and compare it to controls, as well as to study the relationship between quality of sleep and quality of life in euthymic bipolar individuals.

Methods: We studied sleep quality and quality of life in 86 remitted bipolar disorder patients and 86 matched healthy controls using the Pittsburgh Sleep Quality Index (PSQI) and World Health Organization Quality of Life Assessment (WHOQOL-BREF).

Results: There was significantly poorer sleep quality in euthymic bipolar patients compared to controls, especially in subjective sleep quality and sleep duration. WHOQOL-BREF domain scores were lower among patients than controls, with a large effect size. All domains on the PSQI correlated negatively with the domains on the WHOQOL-BREF, with the physical health domain being affected the most. Lack of generalizability of the results and the cross-sectional design that cannot determine causality are the limitations of our study.

Conclusions: Poor sleep quality persists in bipolar patients even in the euthymic phase and correlates with a poor quality of life.

Keywords: Bipolar disorder, sleep quality, quality of life

Key Messages:

1. Patients with bipolar disorder are not completely symptom free even in the euthymic phase.

2. When compared to normal individuals, patients with bipolar disorder have poorer sleep quality even while they are in the euthymic phase.

3. Poor sleep quality may be one of the factors contributing to poor quality of life in these patients.

Bipolar disorder (BD) is a chronic condition characterized by episodic fluctuations in mood, affecting approximately 2.4% of the population globally.[1] Individuals with BD often experience poor functioning, cognitive decline, and reduced quality of life (QoL).[2] Long-term prospective studies have shown that mood fluctuations in BD can vary from subsyndromal to syndromal over time.

Sleep disturbances are commonly reported among individuals with BD. Polysomnographic studies conducted in both bipolar manic and depressed patients have demonstrated fragmented sleep, longer stage 1 sleep, reduced rapid eye movement (REM) latency, and increased REM sleep density.[3] Prospective data indicate a relationship between sleep patterns and mood in BD, with alterations in sleep often preceding mood episodes and correlating with symptom severity. Notably, sleep deprivation has been shown to improve depression in

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BD while potentially triggering mania or hypomania in some cases.[4,5] These findings support the importance of monitoring sleep as a crucial component of relapse prevention strategies in clinical practice.[6] Short sleep duration in BD is associated with higher symptom severity, while both short and prolonged sleep durations are linked to poorer functioning and QoL.[7]

Euthymia, the period of remission between episodes, is often associated with persistent symptoms in patients with BD. Gold et al.[8] noted in their review that even during euthymic periods, 70% of patients with BD experience sleep disturbances. Changes in sleep patterns and disruptions in 24-hour rhythm persist during euthymia, presenting as insomnia, higher sleep latency, variable sleep duration, frequent awakenings, increased REM density, and decreased sleep efficiency.[9–11] Studies such as those by Saunders et al.,[12] who conducted a retrospective analysis of the participants in the "Prechter Longitudinal Study of Bipolar Disorder," further support these observations. Their analysis of 119 euthymic patients with BD and 136 healthy control participants revealed a correlation between poor sleep quality, as measured by the Pittsburgh Sleep Quality Index (PSQI), and factors such as rapid cycling patterns, stressful life events, and neuroticism traits. These findings show a clear relationship between mood and sleep disturbances in BD. However, the strength of this relationship with depression or mania remains unclear, potentially due to variations in the use of different sleep measures across studies, which may account for the divergent results.

Persistent sleep problems during the euthymic phase of BD could significantly affect QoL. While several studies have independently investigated sleep quality and QoL in patients with BD, only a few have explored their association during the euthymic phase. Montezano et al.[13] carried out a cross-sectional analysis of a second wave of a cohort study, which included a sample of depressed adults. They studied the association between sleep quality, global functioning, and cognitive status across three groups: those who had recently converted to bipolar, those not experiencing a mood episode, and those in a depressive episode. While the group without mood episodes showed the best scores on the studied domains, there remained a significant association between cognitive status, functioning, and sleep quality across all groups.

Given the limited existing research, our study aimed to assess sleep quality in patients with BD and compare it with that of the control population. Additionally, we aimed to investigate the association between sleep quality and overall QoL in patients with BD. We hypothesized that patients with BD will have poorer sleep quality even during the euthymic phase and will correlate with lower overall QoL in this population.

Methods

Participants

This article presents a secondary analysis of sleep quality data collected as part of the biological rhythm disturbances in the BD study.[14] This observational study with a cross-sectional design was conducted at the Department of Psychiatry (Kasturba Medical College, Manipal), a tertiary hospital in southern India. Approval for the study was obtained from the Institutional Ethics Committee (The Kasturba Medical College and Kasturba Hospital Institutional Ethics Committee: IEC No. 598/2018 on 25/06/2018). Purposive sampling was used to select participants. The case sample consisted of patients of any gender, aged 18–55 years, diagnosed with BD by a consultant psychiatrist according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth edition (DSM 5) criteria, and currently in remission. Participants with psychiatric co-morbidities and/or major medical illnesses known to affect sleep quality, including bronchial asthma, chronic obstructive pulmonary disease, congestive heart failure, obstructive sleep apnea, and chronic pain, were excluded. The control sample consisted of healthy individuals aged 18–55, of either gender, without any psychiatric diagnosis or major medical conditions known to affect sleep quality, as listed above. All participants provided written informed consent prior to their inclusion in the study.

Tools

The study used a semi-structured proforma to collect sociodemographic and clinical information. The diagnosis of BD was confirmed, and comorbid psychiatric conditions were ruled out using the Mini International Neuropsychiatric Interview (MINI) Plus.[15] The MINI is a widely used structured diagnostic interview, typically administered within 15–20 minutes.

The Young Mania Rating Scale (YMRS)[16] was used to assess manic symptoms. The scale has 11 items and has demonstrated good inter-rater reliability. Scores range from 0 to 60, with a score of <7 denoting remission. The 17-item Hamilton Depression Rating Scale (HAM-D)[17] was used to rate the severity of depressive symptoms. Remission is denoted by a cutoff score of 8. Both scales are clinician-rated.

The PSQI[18] assessed sleep quality and pattern. The PSQI assesses seven domains of sleep over the last month: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. The sum of domain scores produces a global score ranging from 0 to 21 that reflects the overall sleep quality, with scores ≥ 5 indicating poor sleep quality. The PSQI has high internal consistency (Cronbach $\alpha = 0.83$) and is commonly used in sleep research.

QoL was assessed using the World Health Organization Quality of Life Assessment (WHOQOL-BREF),[19] a self-rated scale comprising four domains: physical health (7 items), psychological health (6 items), social relationship (3 items), and environment (8 items). Ratings are made on a 1–5 Likert scale based on the previous 2 weeks, with higher scores indicating better QoL. In BD research, the WHOQOL-BREF has been widely used.

Retrospective life charting was conducted using the National Institute of Mental Health—Life Chart Methodology Clinician Retrospective Chart (NIMH-LCM-CRC),[20] considered the standard for long-term monitoring in BD treatment. This clinician-rated scale charts illness phases over a patient's lifetime and has shown reliability in obtaining

information about previous episodes from patients with BD.

Procedure

In this study, 86 participants were recruited, each in the BD and control group, over 23 months. The MINI PLUS was used to exclude psychiatric co-morbidities in patients and controls. Ongoing mood symptoms in patients were assessed using the YMRS and HAM-D. PSQI was used to assess the sleep quality over the past month. QoL was assessed using the WHOQOL-BREF scale, focusing on the preceding 2 weeks. Information regarding illness episodes was gathered from patients, key informants (individuals who stay with the patient or have witnessed a considerable portion of their illness), and their case files. The NIMH-LCM was used to chart the illness course. We recruited the Controls from the general population and screened them for psychiatric illness using the MINI PLUS scale. Sleep quality and QoL were assessed using PSQI and WHOQOL-BREF, respectively. Subjects and controls were age and gender-matched.

Statistical Analysis

Data were analyzed using SPSS Statistics 20.0 (IBM Corp.). The sociodemographic characteristics of the two groups were compared using independent t-tests and chi-squared tests as applicable. Fisher's exact test was used when the assumptions for chi-squared tests were not met. A multivariate analysis of variance (MANOVA) using Wilk's lambda was conducted to compare the domains of sleep quality and QoL across the two groups, followed by univariate ANOVA. Effect sizes were reported as partial eta squared (η_p^2). Pearson's correlation coefficients (r) were used to evaluate the relationship between sleep quality and QoL domains. All values of $P < 0.05$ were considered statistically significant.

Results

Table 1 summarizes the sociodemographic and clinical variables. The two groups were significantly different in their residential backgrounds, educational status, and occupational status. Though the patient group was better educated, the

control group had fewer unemployed individuals. The patient group had a mostly rural background, while the controls mostly belonged to urban areas. No significant differences were observed between the groups regarding age, gender, marital status, socioeconomic background, and family type.

The mean BD onset age in our sample was 25.4 (standard deviation [SD] 9.6) years. On average, patients experienced a mean number of 4.8 (SD 2.4) affective episodes and had a mean illness duration of 11.7 (SD 8.0) years. Specifically, patients experienced a mean of 2.7 (SD 1.6) manic episodes, 2.3 (SD 1.5) depressive episodes, 1.1 (SD 0.4) hypomanic episodes, and 1.3 (SD 0.8) mixed episodes. When the assessment was conducted, the mean YMRS and HAM-D scores were 1.2 (SD 1.1) and 1.6 (SD 1.3). The average duration of

each episode (in months) was calculated, revealing that depressive episodes lasted the longest (mean 3.0, SD 0.7), while hypomanic episodes had the shortest duration (mean 0.8, SD 0.6). Additionally, it was noted that a greater number of patients initiated their BD with mania. Only two patients began with a mixed episode, while hypomania was notably absent from the onset pattern.

Family history of psychiatric illness was seen more often in the patient group ($P < 0.001$), with BD and substance use being the ones frequently reported. Among patients, 61 (35.5%) were receiving antipsychotics, 78 (45.3%) were on mood stabilizers, and 7 (4.1%) were on antidepressants.

Table 2 shows the sleep quality and QoL rated by the PSQI and WHO-QOL-BREF, respectively. The mean total

TABLE 1.

Sociodemographic and Clinical Characteristics.

	Total $N = 172$	Patients $N = 86$	Controls $N = 86$	P
Age,[†] M (SD)	37.4 (10.1)	37.3 (11.3)	37.5 (8.9)	0.89
Age of onset of illness, M (SD)	–	25.4 (9.6)	–	
Illness years, M (SD)	–	11.7 (8.0)	–	
Lifetime episodes, M (SD)	–	4.8 (2.4)	–	
Gender,[§] n (%)				
Male	89 (51.7%)	41 (47.7)	48 (55.8)	0.28
Female	83 (48.3%)	45 (52.3)	38 (44.2)	
Marital status,[§] n (%)				
Single	53 (30.8)	29 (33.7)	24 (27.9)	0.41
Married	119 (69.2)	57 (66.3)	62 (72.1)	
Education,[§] n (%)				
Up to intermediate	82 (47.7)	52 (60.5)	30 (34.9)	
Graduate and above	90 (52.3)	34 (39.5)	56 (65.1)	0.001[*]
Occupation,[‡] n (%)				
Unemployed	9 (5.2)	9 (10.5)	0	<0.001[*]
Employed	103 (59.9)	42 (48.8)	61 (70.9)	
Homemaker or student	60 (34.9)	35 (40.7)	25 (29.1)	
Socioeconomic status,[§] n (%)				
Lower	35 (20.3)	21 (24.4)	14 (16.3)	0.19
Middle	112 (65.1)	56 (65.1)	56 (65.1)	
Higher	25 (14.5)	9 (10.5)	16 (18.6)	
Family type,[§] n (%)				
Nuclear	129 (75.0)	65 (75.6)	64 (74.4)	0.027[*]
Joint	43 (25.0)	21 (24.4)	22 (25.6)	
Residence,[§] n (%)				
Rural	47 (27.3)	31 (36.0)	16 (18.6)	0.01[*]
Urban	125 (72.7)	55 (64.0)	70 (81.4)	
Index episode, n (%)				
Mania or mixed	–	46 (53.5)	–	
Depression		40 (46.5)		
Family psychiatric illness,[§] n (%)				
Present	62 (36.0)	50 (58.1)	12 (14.0)	<0.001[*]
Absent	110 (64.0)	36 (41.9)	74 (86.0)	

*$P < 0.05$ (two tailed). [†]Independent t-test. [§]Chi-square test. [‡]Fisher's exact test.

TABLE 2.

Sleep Quality and Quality of Life (*N* = 172).

		Patients N = 86	Controls N = 86	F	P	Effect size (η_p^2)
PSQI Domains	Subjective sleep quality	1.16 (0.70)	0.43 (0.49)	62.5	<0.001*	0.27
	Sleep latency	0.60 (0.72)	0.06 (0.23)	44.3	<0.001*	0.21
	Sleep duration	0.84 (0.59)	0.59 (0.56)	7.7	0.006*	0.04
	Habitual sleep efficiency	0.56 (0.68)	0	58.1	<0.001*	0.26
	Sleep disturbances	0.70 (0.53)	0.38 (0.51)	15.5	<0.001*	0.08
	Use of sleeping medication	0.16 (0.40)	0	11.4	0.001*	0.06
	Daytime dysfunction	0.59 (0.66)	0.24 (0.48)	15.7	<0.001*	0.09
PSQI total score		4.62 (2.88)	1.72 (1.49)	68.3	<0.001*	0.29
WHO QoL	Physical health	21.9 (1.9)	23.1 (2.4)	10.9	0.001*	0.06
	Psychological	18.4 (1.9)	21.1 (1.9)	82.4	<0.001*	0.33
	Social relationships	8.9 (1.5)	12 (1.4)	203.3	<0.001*	0.55
	Environment	26.4 (2.8)	32 (3.8)	121.1	<0.001*	0.42
Overall QoL and general health		6.8 (0.9)	7.6 (1.1)	28.9	<0.001*	0.15

All values are M (SD). *P < 0.05 (two tailed). QoL, Quality of life; PSQI, Pittsburg Sleep Quality Index.

TABLE 3.

Correlation (*r*) Between PSQI and WHOQOL-BREF in Bipolar Disorder Patients (*N* = 86).

		WHOQOL-BREF domains				
		Physical health	Psychological health	Social relationships	Environment	Overall QoL and general health
PSQI Domains	Subjective sleep quality	–0.63*	–0.51*	–0.40*	–0.38*	–0.56*
	Sleep latency	–0.48*	–0.50*	–0.41*	–0.28*	–0.47*
	Sleep duration	–0.49*	–0.43*	–0.20	–0.15	–0.40*
	Habitual sleep efficiency	–0.50*	–0.48*	–0.38*	–0.31*	–0.42*
	Sleep disturbances	–0.34*	–0.25*	–0.07	0.07	–0.24*
	Use of sleeping medication	–0.35*	–0.41*	–0.20	–0.24*	–0.20
	Daytime dysfunction	–0.52*	–0.42*	–0.39*	–0.24*	–0.48*
	PSQI global score	–0.72*	–0.65*	–0.46*	–0.34*	–0.62*

*P < 0.05 (two tailed). QoL, quality of life; PSQI, Pittsburg Sleep Quality Index.

PSQI scores for the patients (4.6, SD 2.9) are higher than controls (1.7, SD 1.5). MANOVA showed a statistically significant difference in the quality of sleep between the two groups (Wilk's ∧ = 0.66, P < 0.001, η_p^2 = 0.342). A statistical significance across the two groups was found in all the domains of the PSQI rating scale and the total score. Among patients, the most impaired domains of the PSQI were subjective sleep quality and duration. The difference across the two groups was statistically significant across all the WHOQOL-BREF domains,

the overall QoL, and general health (P < 0.001). The control group scored higher on all four domains of the QoL, including the overall QoL and general health.

Table 3 depicts the correlations between various domains of PSQI and WHOQOL-BREF. Our study revealed a negative correlation between most components of PSQI and WHOQOL-BREF. Specifically, higher scores on the subjective sleep quality domains were associated with lower scores in all four domains of QoL, as well as overall QoL and general health. Thus, poorer subjective sleep quality

correlates with poorer QoL across all spheres. Physical health emerged as the most affected domain, showing a strong correlation (r > 0.5). The environmental domain has the least association. Sleep latency also demonstrated a negative correlation with all the domains on the WHOQOL-BREF, indicating that longer sleep latency is associated with poorer QoL. A stronger association was seen in the psychological domain (r = 0.5), while association with the environmental domain was the lowest. Sleep duration scores were negatively correlated with all domains of the WHOQOL-BREF. However, statistically significant correlations were only observed with physical health, psychological health, and overall QoL. Lower sleep duration was associated with poorer QoL, particularly for physical health, with a medium effect size (r = 0.49).

The habitual sleep efficiency component negatively correlated with all the QoL domains and general health. The association was strongest for the physical health domain, with a medium effect size (r = 0.50). Sleep disturbances showed a negative correlation with all aspects of QoL. However, a statistically significant correlation was noted only between physical and psychological QoL, with the strongest being physical. The effect size for the association, however, was medium (r = 0.34). The use of sleeping medications also showed a negative correlation with all domains of QoL except the social domain and overall health. The association was strongest with psychological health, with a medium effect size (r = 0.41). Daytime dysfunction scores showed a statistically significant negative correlation with all domains of QoL, with a strong correlation with the physical health domain (r = 0.52). Global scores of PSQI also negatively correlated with all domains of WHOQOL-BREF, especially physical and psychological health, with a large effect size (r = 0.72 and 0.65).

Discussion

Our study found that patients with BD, even during the euthymic phase, show poorer sleep quality than the control population. Specifically, 35 patients (40.7%) were identified as poor sleepers. Across all domains of the PSQI assessing sleep quality, the remitted

BD group fared worse than normal controls, with subjective sleep quality and sleep duration being the most affected domains. These findings mirror those cited in previous studies, suggesting that sleep disturbances may persist in patients with BD even during periods of euthymia,[11,21] and compared to healthy controls.[9,10] A recent Nigerian cross-sectional study on 76 euthymic bipolar patients reported that 48.7% had poor sleep quality, with independent associations found in subjective sleep quality, daytime dysfunction, and ongoing sleep medication use.[22] Further support comes from actigraphy studies, revealing that patients with BD in remission tend to sleep longer, have a longer onset sleep latency, and experience a higher variability across nights when compared to healthy controls.[10] A meta-analysis of actigraphy studies[23] showed significant differences in standardized mean difference for sleep latency, duration, and efficiency of sleep and wake after sleep onset. Our study also found a poorer QoL in bipolar patients as compared to controls; the findings are included in a previous paper on the biological rhythm disturbances in BD.[14]

In our study, all the domains on the PSQI negatively correlated with all domains on the WHOQOL-BREF, implying that poor sleep quality is related to a reduction in QoL in bipolar patients, even if not in an episode. Physical health emerged as the most affected domain, while environmental health was affected the least. Our findings are like those of earlier studies. In a study involving outpatients with BD in remission, 56.5% had poor sleep quality, which was associated with lower emotional and intellectual functioning, poor household relations, lack of initiative, lowered self-sufficiency, and overall reduced functionality.[24] Another study on euthymic patients with BD found that half of the participants reported at least one sleep complaint, with sleep satisfaction significantly influencing their QoL.[25] Moreover, a recent study[26] has highlighted a notable difference between patients with unipolar depression and those with BD: even during the euthymic phase, individuals with BD experienced a strong link between QoL and sleep difficulties, both reduced and excessive sleep.

Recently, there has been an attempt to identify biological markers that may regulate sleep disorders in bipolar patients. Neuroglial cells, particularly astrocytes, which are the chief homeostatic cells of the CNS, have been observed to be atrophied and lesser in number in specific brain regions associated with BD.[27] Poor glial support and lack of neuroprotection may thus have a significant role in the pathophysiology of BD.[27]

Poor sleep quality during periods of remission can be conceptualized in the following ways: (1) as an early symptom of a new affective episode, changes in sleep patterns may serve as an early indicator of an impending mood disturbance in individuals with BD; (2) as a precipitator of a new affective episode: disrupted sleep may trigger the onset of an episode; (3) as a residual symptom of a remitted affective episode: sleep disturbances may persist even after mood symptoms have subsided, reflecting ongoing dysregulation in the sleep-wake cycle; (4) as a discriminating attribute of a bipolar phenotype: poor sleep quality could be considered a hallmark feature that distinguishes individuals with BD from those with other psychiatric conditions; and (5) as a comorbid sleep disorder: poor sleep could be a symptom of a sleep disorder cooccurring with BD.[12]

Poor sleep quality may contribute to lower QoL in patients with BD. Routinely assessing sleep disturbances while eliciting history and addressing sleep disturbances, even when the patient is euthymic, could improve sleep quality, functionality, and overall QoL for individuals with BD.

Our study had several limitations. First, the patient sample was taken from a tertiary hospital, which limits generalizability to patients with BD in the community, which could include milder forms. Second, the cross-sectional design of the study precludes conclusions on the causal relationship between sleep quality and QoL. Longitudinal studies will be required to determine the relationship of sleep disturbances with QoL in the long term.

In conclusion, our study found that patients diagnosed with BD have poor sleep quality compared to controls, even during the inter-episodic period. Additionally, their QoL is poorer than that of the controls. Our findings suggest that poor quality of sleep may contribute to the diminished QoL experienced by these patients. Consequently, sleep disturbance is a crucial aspect of the construct of BD.

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