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Sleep quality and emotional reactivity cluster in bipolar disorders and impact on functioning

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ABSTRACT

Objective: Bipolar disorders (BD) are characterized by sleep disturbances and emotional dysregulation both during acute episodes and remission periods. We hypothesized that sleep quality (SQ) and emotional reactivity (ER) defined clusters of patients with no or abnormal SQ and ER and we studied the association with functioning.
Method: We performed a bi-dimensional cluster analysis using SQ and ER measures in a sample of 533 outpatients patients with BD (in remission or with subsyndromal mood symptoms). Clusters were compared for mood symptoms, sleep profile and functioning.
Results: We identified three clusters of patients: C1 (normal ER and SQ, 54%), C2 (hypo-ER and low SQ, 22%) and C3 (hyper-ER and low SQ, 24%). C1 was characterized by minimal mood symptoms, better sleep profile and higher functioning than other clusters. Although highly different for ER, C2 and C3 had similar levels of subsyndromal mood symptoms as assessed using classical mood scales. When exploring sleep domains, C2 showed poor sleep efficiency and a trend for longer sleep latency as compared to C3. Interestingly, alterations in functioning were similar in C2 and C3, with no difference in any of the sub-domains.
Conclusion: Abnormalities in ER and SQ delineated three clusters of patients with BD and significantly impacted on functioning.

1. Introduction

'Core dimensional features' can help characterizing Bipolar Disorders (BD), among which sleep disturbances and emotion dysregulation might be of particular importance. Perturbations of sleep (mainly quantity but also quality) belong to diagnostic criteria for both depressive and (hypo)-manic episodes [1]. Interestingly, these abnormalities of sleep continuity, regularity and quality also persist during periods of remission in BD, thus being considered as core trait dimensions. Indeed, insomnia symptoms are frequently observed in remitted patients with BD, with 55% of them who meet the strict diagnostic criteria for primary insomnia

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(this being defined according to DSM-IV criteria) [2]. Hypersomnia symptoms have also been described as frequent during major depressive episodes in BD [3] and also persist in 25% of patients with BD during euthymia [4]. Using a self-report of sleep quality in euthymic patients with BD, Rocha et al. showed that 82% of the patients had poor sleep quality as compared to 21% of the control group [5]. In the FACE-BD cohort, we found similar results with 55% of patients reporting abnormal sleep quality [6]. The persistence of sleep abnormalities during euthymia in BD has been demonstrated when using various subjective and objective assessments such as questionnaires, sleep diaries, polysomnography and actigraphy [7]. Recently, two meta-analyses of actigraphic studies demonstrated that abnormalities in sleep duration, continuity, latency and efficiency significantly differed in patients in remission as compared to healthy controls [8,9]. Such persisting abnormalities are of major importance for prognosis since sleep disturbances during euthymia have been associated with a higher risk for mood episode recurrences [10–12] and have an impact on neurocognition [13], functioning [14] and quality of life [15]. Moreover, sleep abnormalities might be associated with emotional dysregulation in patients with BD, as suggested in recent reviews [16–18]. Sleep might affect consecutive emotional reactivity and conversely sleep quality might be affected by reactions to emotional events. Some bidirectional links between sleep and emotional reactivity have been thus postulated to be central in the pathophysiology of BD [16–18].

In patients with BD, disturbed emotional reactivity has been described during acute mood episodes but also persists during euthymia [19]. Emotional reactivity refers both to emotion response intensity and emotion response threshold for salient stimuli. Subjective and objective assessments of emotional reactivity during euthymia have shown: more intense and more labile emotions assessed by self-questionnaires [20] and an increased positive attribution to neutral stimuli corroborated by startle reflex using an emotional induction task [21] in patients with BD as compared to healthy controls. An experience sampling procedure has suggested that remitted patients with BD were characterized by amplified emotionality as well as increased efforts to regulate emotions in everyday life [22]. Furthermore, several meta-analyses have suggested an over activation of the limbic system in BD, that mediates the emotional responses to stimuli [23–25]. As emotion intensity was correlated with the number of mood episodes in euthymic patients [20], such a dimension was suggested as a marker of proneness to mood recurrences. Finally, it has been recently hypothesized that emotional dysregulation could impact the functioning of patients with BD [26,27], alter cognitive functioning [28] and that self-rated emotion perception was linked to subjective well-being [29].

While sleep abnormalities and emotional reactivity/intensity might represent 'core' dimensions of BD, very few studies specifically focused on the links between these two components [16,17]. Two studies explored the directional links between sleep and mood (but not emotional regulation at large) in BD using daily rating by sleep diaries and mood measures. Among other results, they suggested that total wake time was associated with next morning negative mood, whereas evening negative mood was associated with subsequent total wake time [30,31]. The literature is much more dense when exploring similar links between sleep and emotion dysregulations in the general population. For example, in resident students, sleep loss induced by nigh shift and assessed by actigraphy was associated with the amplification of negative emotional effects of disruptive events and the reduction of positive effects of goal enhancing events [32]. In a fMRI (functional Magnetic Resonance Imaging) study, sleep deprivation in healthy participants involved an increased amygdala activation during an emotional stimulus viewing task [33], and when combined with polysomnography, REM (Rapid Eye Movement) sleep was specifically involved in the dissipation of amygdala activity in response to previous emotional experiences [34]. Far from being exhaustive, these latter arguments suggested that sleep disturbances and emotional regulation deficits might be associated [16] in BD; maybe because they are underpinned by overlapping neurobiological systems and brain structures (mainly prefrontal cortex-limbic connections) [18]. However the research specifically in BD remains scarce.

Therefore, we hypothesized that abnormal sleep quality and disturbed emotional reactivity were associated dimensions that impacted on functioning in BD. Our main goal was to study the clustering of sleep and emotional reactivity disturbances in patients with BD during euthymia. We conducted a cluster analysis and explored whether the identified clusters differed for their sleep profile and various domains of functioning.

2. Methods

2.1. Population

The participants ($n = 533$) were adult outpatients with BD assessed within the French Network of Bipolar Expert Centres implemented by the FondaMental foundation (FACE-BD for FondaMental Advanced Centres of Expertise in Bipolar Disorders) [35]. The primary psychiatric diagnosis was made by trained psychiatrists or psychologists using the Structured Interview for DSM-IV Axis I Disorders (SCID) [36].

Inclusion criteria were: (A) a diagnosis of BD type I, II or NOS (Not Otherwise Specified) (1), (B) the absence of any major mood episode (of any polarity) according to DMS-IV criteria (1) at inclusion and within three months before the assessment, (C) baseline scores < 15 at the Mongomery-Asberg Depression Rating Scale [37] and at the Young Manic Rating Scale [38].

Therefore, patients were either in remission or with subsyndromal mood symptoms according to the criteria provided by the International Society for Bipolar Disorders (ISBD) Task Force report on the nomenclature of course and outcome in BD [39].

2.2. Assessments for sleep quality, emotional reactivity and functioning

Subjective sleep quality was assessed with the Pittsburgh Sleep Quality Index (PSQI). This 19-item self-questionnaire generated a total score ranging from 0 to 21 [40] and 7 sub-components (each ranging from 0 to 3): sleep quality (overall subjective sleep quality rated by the patient), sleep latency (time to fall asleep), sleep duration (number of hours of actual sleep), sleep disturbances (frequency of nightmares, snoring, abnormal awakening, or other problems during the night), sleep efficiency (ratio of the total time spent asleep in a night compared to the total amount of time spent in bed), use of sleeping medication (frequency of use per week to promote sleep) and daytime dysfunction due to sleepiness (trouble staying awake, lack of energy or enthusiasm). We used the validated French version [41]. A total score equal or above 5 is in favor of sleep disturbances with clinical significance.

Emotional reactivity was measured with the aforesaid component of the Multidimensional Assessment of Thymic State (Mathys), a validated French scale [42,43]. The Mathys is a visual analogic scale that explores five dimensions (emotional reactivity, cognition speed, psychomotor activation, motivation and sensory perception) that can vary from inhibition to activation. The MAThyS evaluates a state rather than a trait of emotional reactivity. A subject is asked to assess his current emotional state compared to usual, and not in comparison to a normal euthymic

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