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Original Article

Sleep quality changes in chronically depressed patients treated with Mindfulness-based Cognitive Therapy or the Cognitive Behavioral Analysis System of Psychotherapy: a pilot study



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ABSTRACT

Objective: To capture any sleep quality changes associated with group psychotherapy.

Patients/methods: Physician-referred, chronically depressed patients ($n = 25$) were randomized to either eight group sessions of Mindfulness-based Cognitive Therapy (MBCT, $n = 9$) plus Treatment As Usual (TAU), or the Cognitive Behavioral Analysis System of Psychotherapy (CBASP, $n = 8$) plus TAU, or to TAU only (control group, $n = 8$). Participants recorded their sleep at home. The primary outcome variables were: stable and unstable sleep, which were assessed using cardiopulmonary coupling (CPC) analysis, and estimated total sleep and wake time (minutes). Cardiopulmonary coupling measures heart rate variability and the electrocardiogram's R-wave amplitude fluctuations associated with respiration.

Results: By post-treatment night 6, the CBASP group had more stable sleep ($p = 0.044$) and less wake ($p = 0.004$) compared with TAU, and less wake vs MBCT ($p = 0.039$).

Conclusion: The CBASP group psychotherapy treatment improved sleep quality compared with Treatment As Usual.

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1. Introduction

Poor and fragmented sleep quality is linked to many medical disorders, including major depression [1–3]. It is a frequent complaint in the adult population [4], suggesting that measuring sleep quality could have important clinical implications that are relevant to the use and efficacy of psychotherapy [5]. From in-lab polysomnography Thase et al. [5] found that sleep fragmentation and abnormal sleep profiles were associated with a lack of response to interpersonal psychotherapy in patients with unipolar or bipolar depression.

Decreased sleep quality that is objectively measured by polysomnography electroencephalography (EEG) has been shown to be associated with slower and lower rates of remission from depression [6]. Significant reductions in cyclic alternating pattern rate (CAP) [7], a bio-marker of fragmented sleep characterized as repetitive EEG patterns separated by time-equivalent intervals of background activity, were found in patients with major depression

treated with antidepressant medication, resulting in enhanced stable or non-CAP sleep [8].

Sleep improvement associated with cognitive behavioral psychotherapy and escitalopram intervention was measured in patients who were comorbid with major depression and insomnia [9]. The combination group of escitalopram and cognitive behavioral therapy for insomnia had higher remission rates of depression and insomnia symptoms, which were measured by depression scales, sleep diaries, and actigraphy measures, respectively, compared with the escitalopram only group. Among veterans, a reduction in insomnia and depression severity and improvement in quality of life was found following treatment with cognitive behavioral therapy for insomnia [10]. Collectively, these results have indicated that symptomatically depressed patients have reduced sleep quality that might be quantifiable using an electrocardiogram (ECG)-based method that correlates with CAP.

An ECG-based method termed cardiopulmonary coupling (CPC) measures sleep quality (stable/unstable sleep), and together with actigraphy estimates sleep and wake time. Cardiopulmonary coupling analysis determines the synchronization between modulations of respiration and heart rate variability that has been shown to be associated with the presence of EEG-CAP during sleep [11]. Utilization of continuous ECG data has shown stable sleep restoration

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in medicated and depressed patients [12], and improved sleep stability in patients with heart failure undergoing a Tai Chi exercise program [13].

Since psychotherapy for depression is expected to improve depressive symptoms, enhanced sleep quality may also occur and be detectable by CPC measures. Consequently, the present study examined sleep recordings of two consecutive nights per session recorded in the home environment at baseline (T0), mid point (T1) and end of treatment (T2), with the following hypotheses: CPC sleep quality variables will show improvement from baseline to post-treatment in response to group psychotherapy (primary hypothesis); and psychometrics for chronic depression will be linked to sleep stability (secondary hypothesis).

2. Methods

2.1. Design

The study had a randomized, single blind design. Sleep assessment was investigated as a pilot project using a subsample ($n = 25$) of the Freiburg-site-recruited patients ($n = 36$, including two non-starters) with major depressive disorders and participating in the main study. The main study included 106 patients and who were investigated at two trial sites (site A, located at the Ruhr megalopolis and site B, located in Freiburg im Breisgau, Germany) for the efficacy of group MBCT plus Treatment As Usual (TAU) and group CBASP plus TAU as treatments for chronic depression. The alternative psychotherapeutic approach relies on different mechanisms of change in patients with chronic depression [14]. In brief, the main study found that using the entire sample of MBCT plus TAU from both testing sites was not more effective than TAU alone, and that group CBASP plus TAU was more effective than TAU in reducing depressive symptoms. Analysis by treatment site showed that MBCT plus TAU was superior to TAU only in reducing depressive symptoms at site B [14].

2.2. Interventions

2.2.1. Treatment As Usual

All enrolled patients received psychiatric concurrent treatment from a non-study team psychiatrist or psychotherapist for the duration of the study. Those who entered the study and were not receiving psychiatric care were asked to choose a psychiatrist of their choice for the study period. No restrictions were placed on study participants regarding current medication use, appointments with their psychiatrist, or other forms of supplemental therapy.

2.2.2. Mindfulness-based Cognitive Therapy

Mindfulness-based Cognitive Therapy (MBCT) [15,16] aims to teach patients to step out of negative ruminative states of mind and to mindfully (re)connect with the experiences of the present moment. The MBCT participants each received an individual pre-class interview and eight, weekly 2.5-hour group sessions. Group size ranged from four to six participants per class. Group sessions involved guided mindfulness practices (ie, body scan, sitting meditation, yoga) and inquiry into patients' experience of these practices and of experiences during weekly homework (ie, 40 minutes of mindfulness practice per day and generalization of session learning). Cognitive behavioral skills for dealing with depression were taught and discussed during group sessions. All group sessions were conducted by experienced psychotherapists and videotaped with digital cameras for therapist supervision and analyses of treatment adherence.

2.2.3. The Cognitive Behavioral Analysis System of Psychotherapy

The Cognitive Behavioral Analysis System of Psychotherapy (CBASP) [17,18] is the only psychotherapy model specifically

developed for the treatment of chronic forms of depression. The CBASP participants received two individual pre-class interviews and eight, weekly 2.5-hour group sessions. Group sizes ranged from four to six participants per class and followed the manual developed by McCullough [17], and modified for the group setting [18]. The main objective in CBASP is to learn to recognize the interpersonal consequences of one's own behavior and to develop social skills. Specific techniques (eg, Situation Analysis, Interpersonal Discrimination Exercise) are applied to aid acquisition of perceived functionality in the patient. The main modifications from individual to the group setting included the derivation of the transference hypothesis with regard to the group and to the therapist, and to use disciplined personal involvement more sparsely compared with individual treatment. The Kiesler Circle model was used in an educational and structured way in interpersonal problematic situations during the sessions. The situational analysis is the main CBASP technique and in the group version, one patient delivered an example and all participants contributed to the single steps, including the role-play sequences. Each group member had an opportunity to contribute an example during each session.

2.3. Groups and setting

This study's subsample of the Freiburg site's participants consisted of physician-referred chronically depressed patients ($n = 25$) randomized by a central independent allocator to group versions of: MBCT [15,16] plus TAU; CBASP [17–19] plus TAU; or TAU only as the control group. Blinded raters assessed depression severity. Participation in a minimum of four group sessions was considered an adequate dose of psychotherapeutic treatment. All participants provided written, informed consent and the subgroup agreed to sleep recordings before entering the study and randomization. The university's institutional review board and the Research Ethics Committee of the German Psychological Association approved the study.

2.4. Participants

Patients were encouraged to continue use of any current medication and to attend appointments with their psychiatrist or psychotherapist. Patients were recruited from community healthcare facilities or private practices. They were pre-screened by telephone and invited to undergo an extended diagnostic interview before inclusion into the study. Inclusion criteria included: (1) being aged between 18 and 75 years; (2) meeting diagnostic criteria for a current major depressive disorder defined by the *Diagnostic and Statistical Manual of Mental Disorders* [20] {assessment used the German version of the Structured Clinical Interview for DSM-IV (SCID) [21]} and depressive symptoms for more than two years without remission; (3) double depression (ie, current major depression with antecedent dysthymic disorder), chronic major depression, or recurrent major depression with incomplete recovery between episodes. Patients were excluded if they: (1) had a lifetime diagnosis of a bipolar disorder, a primary anxiety disorder, an eating disorder, schizophrenia, or schizo-affective disorder; (2) had a substance-use disorder in the past three months; (3) were using alcohol; (4) had a confirmed or suspected pregnancy or were currently lactating females; (5) had seizures or other neurological disorders, dermatological conditions, and unstable cardiac, pulmonary, endocrine, or renal disorder; (6) had a known clinical sleep disorder; (7) had a family history of narcolepsy; (8) had an inability to participate in MBCT exercises for any reason; (10) had a pacemaker implant; and (11) had cardiac-related problems.

Nine of the 34 (12 male/22 female; mean age 49.24 ± 9.91 years) participants who started the study (26%) at site B in the department of Psychiatry and Psychotherapy at the University of Freiburg,

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