Original Research

The Effectiveness of Mindfulness-based Cognitive Therapy on Sleep Quality of Students with Social Anxiety Disorder

Saeed Mohammadi[1], Mahboobeh Maleki[2], Mojtaba Tashkeh[3*], Aliakbar Foroughi[4], Golfam Goodarzi[4]

[1.] *Department of Clinical Psychology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran*
[2.] *Department of Clinical Psychology, School of Psychology and Educational Sciences, Allameh Tabataba'i University, Tehran, Iran*
[3.] *Department of Clinical Psychology, School of Medicine, Iran University of Medical Sciences, Tehran, Iran*
[4.] *Department of Clinical Psychology, School of Medicine, Kermanshah University of Medical Sciences, Kermanshah, Iran*

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Abstract

Background and Objective: Anxiety disorders are usually accompanied with sleep disorders. Since limited studies have focused on the effectiveness of mindfulness-based cognitive therapy (MBCT) on anxiety-related problems such as sleep disorders, the current research was conducted to investigate the effectiveness of this intervention on sleep problems.

Materials and Methods: This study was a clinical trial with control and treatment groups. The sample consisted of 24 university students diagnosed with social anxiety disorder (SAD). Social Interaction Anxiety Scale (SIAS) and Pittsburgh Sleep Quality Index (PSQI) were used to assess the dependent variables. There were measurements during pre-test, post-test, and follow-up stages.

Results: The treatment could significantly improve the anxiety and sleeping problems in patients with social anxiety. Assessing the aspects of sleep quality showed that the intervention could improve the subjective aspects, latency, disturbance, and daily dysfunctions of sleep effectively; however, there was no significant effect on the duration of sleep, taking sleep medications, or sleep efficiency.

Conclusion: Mindfulness treatment could be used for improving sleep quality in patients with social anxiety. This treatment could also improve the aspects of sleep quality which are related to sleep threshold.

Keywords: Social anxiety; Sleep quality; Mindfulness-based cognitive therapy; Students

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Introduction

Having social contact with other fellowmen as one of the basic needs of human beings is of great importance. Therefore, because of this significance, people are afraid of the others' negative appraisal or judgment (1). Social anxiety disorder (SAD) is identified by severe fear or anxiety about social situations in which the individual thinks he/she is being watched with care (2). SAD is known as one of the most common disorders in young individuals (3, 4), accounting for about 13% of the population (5). This disorder not only leads to isolation of some patients socially (6), but also affects their occupational, educational, and interpersonal performance negatively (1). It also imposes great amounts of costs on every country's economy every year (7, 8). If not treated, this disorder might become chronic and interfere with daily life and even relationships and personal activities (9, 10).

Many studies have been carried out so far to investigate the relationship between anxiety or anxiety disorders and sleep problems. Being diagnosed with anxiety disorders is related to sleep quality since such disorders cause lack of sleep and sleep problems (2, 11-13). Anxiety is a major risk factor for sleep deprivation and people who experience

**** Corresponding author**: M. Tashkeh, Department of Clinical Psychology, School of Medicine, Iran University of Medical Sciences, Tehran, Iran*
Tel: +98 916 553 5654, Fax: +98 83 38223775
Email: mojtabatashkeh@gmail.com

high levels of anxiety are more exposed to sleep deprivation and low sleep quality (14). According to the results of Horvath et al.'s study, the parameters of non-rapid eye movement (NREM) sleep are affected by state and trait anxiety. Sleep onset latency (SOL) is mainly affected by state anxiety while rapid eye movement (REM) parameters are related to trait anxiety (15). In a study to investigate the relationship between trait-state anxiety and sleep quality dimensions, the results showed that the anxiety of the state and trait together predicted more subjective sleep quality and contributed less to the prediction of sleep duration (16).

So far, pharmacological and psychological interventions such as behavioral therapy, psychoanalysis, and cognitive therapy have been used by clinicians to improve the symptoms of SAD (17-24), which cognitive behavioral therapies (CBTs) have attracted more attention (25). One group of the third-wave CBTs are mindfulness-based interventions. These interventions are opposed to focusing on the past or on the future and include educating people for having a new perspective, non-judgmental acceptance, being in closer touch with feelings, thoughts, and body sensations, in order to get rid of negative mood states (26) Mindfulness-based cognitive therapy (MBCT) is one of the most important third-wave treatments. During therapy, patients learn how to interrelate with their own irrational thoughts, feelings, and beliefs and focus on changing their content, so that they become more rational (27). Many studies have previously shown that mindfulness-based interventions lead to better sleep quality of patients (27-30).

As it was mentioned in different studies, one of the factors that is negatively affected in people diagnosed with anxiety disorders is sleep quality. Even though the effectiveness of MBCT on psychiatric disorders has been previously investigated in many studies, to the best of our knowledge, limited research has studied the effectiveness of this treatment on sleep quality and social anxiety in patients diagnosed with SAD. Therefore, the current study was conducted to assess the effectiveness of MBCT on social anxiety and sleep quality in students suffering from anxiety disorders.

Materials and Methods

This study was a clinical trial with control and experimental groups approved by the IRCT20190222042797N1 code in the Iranian Registry of Clinical Trials (IRCT). It was approved by the Ethics Committee of Kermanshah University of Medical Sciences, Kermanshah, Iran (IR.KUMS.REC.1397.952). This article is based on a research project with code of 97928 in Kermanshah University of Medical Sciences. The sample was collected from all students suffering from social anxiety in Kermanshah University of Medical Sciences using purposive sampling. Sample size was determined based on the average number of previous MBCT published studies (31). 12 people were needed for each group. The study began on February 20, 2019 and ended on August 11, 2019.

First, the participants were informed of the research via announcements in university's social media and posters in different schools and also the dormitory; in addition, some with symptoms of social anxiety were invited by the counseling center of the university to participate in a free session of psychological assessment. Diagnostic interview was done by a clinical psychologist according to Anxiety Disorders Interview Schedule (ADIS-IV) for all the participants. After considering the inclusion criteria and exclusion criteria, the ones interested were randomly assigned to control and experimental groups based on the codes of a random number generator (http://stattrek.com/statistics/random-number-generator.aspx). Inclusion criteria were being diagnosed with SAD, having informed consent, no participation in psychotherapy sessions during the last year, taking no psychiatric medication during the last year, not being diagnosed with other comorbid anxiety disorders, not being diagnosed with mood disorders or other severe psychiatric or neurologic disorders, and not being addicted to substance or alcohol. Exclusion criteria were not being interested in participating in the therapy sessions or simultaneous participation in another therapy program. The questionnaires were administered in three stages one day before the test, one day after the test, and during the two-month follow-up period at the university's counseling centers, and the subjects were asked to answer all the questions carefully. In order to prepare the patients for the therapeutic program, they had a pre-class interview with their therapist before the treatment sessions started. In experimental group, eight 150-minute sessions were held according to Segal et al.'s MBCT protocol (31) (Table 1).

Table 1. The summery of the contents of mindfulness-based intervention sessions

Session number	Aims	Session content	Expected behavior change	Homework
1	Introduction and goal setting	Mindfulness exercise - body scan exercise	Awareness towards moments	Breathing exercise (three times a day)
2	Concentrating on body and controlling daily events	Body scan meditation - thoughts and feelings exercise - writing down the desirable events	Coping with barriers	Writing down reports of desirable daily events
3	Breathing and stretching exercise	Mindful walking - listing undesirable events	Mindful breathing	Identifying and writing down undesirable experiences - repeating the first stage
4	Learning to breathe	Sitting meditation – three-minute breath	Being present in the moment	Sitting meditation
5	Acceptance and letting the presence	Sitting meditation - emphasizing on focus on thoughts, feelings, and body sensations	Reacting to thoughts and feelings	Sitting meditation - repeating the first stage
6	Awareness of breath and body	Moods, thoughts, alternative attitude exercise - determining signs of relapse	The effect of breath on body	Repeating stage five
7	Self-care in the best possible way	Becoming aware of the relatedness of activities and mood - daily list of thoughts and feelings - identifying relapse symptoms and coping with them	Dealing with mood	Repeating stage five - relapse prevention
8	Regular mindfulness exercise and keeping life balanced	Body scan exercise - reviewing the whole program - sitting meditation - handing out questionnaires (post-test)	Mindfulness and relapse prevention	Repeating the stage

The treatment program was applied by a master in clinical psychology (first author) who had been trained for applying the program under the supervision of a PhD holder in clinical psychology. In control group, no intervention was done. One of the participants in this group, due to lack of availability, did not complete the follow-up assessment. Figure 1 shows patients' allocations.

All the participants were informed of the procedure of this study before beginning the sessions and handed in their informed consent form. After finishing the sessions, the participants were referred to other psychotherapists or psychiatrists for receiving complementary therapy sessions if needed.

ADIS for Diagnostic and Statistical Manual-Fourth Edition (DSM-IV) adult version (ADIS-IV): ADIS-IV which was designed in 1994 by Brown et al. is a semi-structured interview for anxiety disorders and can be used for clinical and diagnostic purposes (32).

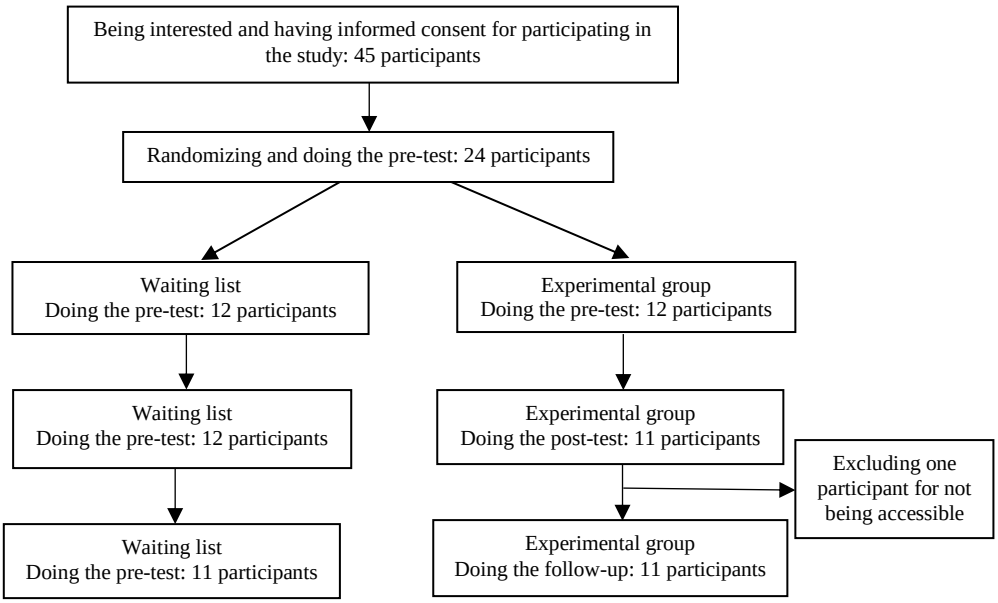

Figure 1. The participants' diagram during pre-test, post-test, and follow-up

Except for anxiety disorders, it can be utilized for mood disorders, somatoform disorders, psychosis, and substance abuse disorder. Clinician's Severity Rating (CSR) is measured between zero (no symptoms) to eight (highly disturbing symptoms). CSR of ADIS-IV is used for differentiating clinical and sub-clinical diagnoses. According to it, rates of four or more show that the symptoms of the patient are enough for the diagnostic threshold of DSM-IV, text revision (DSM-IV-TR) or even higher than that (i.e., complete concordance with the diagnostic symptoms of that disorder). Rates of three or less lead to diagnoses of relative or complete recovery. In result-oriented research where ADIS-IV is used, CSR is usually used as a parameter for recovery after therapy and follow-up (32). The content validity of the Persian version of this scale was approved and its test-retest reliability coefficient after a week was reported to be 0.83 (33). In the current research, this scale was used for screening and confirming the mentioned clinical diagnoses, plus for rating the severity of SAD.

Pittsburgh Sleep Quality Index (PSQI): PSQI is a self-administered questionnaire, which consists of 19 questions generating seven component scores of subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. Total score ranges from 0 to 21. The respondents with PSQI > 5 are considered to have poor sleep quality (34). A validated and reliable Persian version of this questionnaire was applied in the current survey (35).

Social Interaction Anxiety Scale (SIAS): This questionnaire has been made by Heimberg et al. in 1992. The SIAS is a 20-item self-report questionnaire. Internal consistency of SIAS in social phobia sample, community sample, and undergraduate sample has been reported to be $\alpha = 0.86$, $\alpha = 0.95$, and $\alpha = 0.85$, respectively (36). Tavoli et al. translated and standardized this scale in Iran (37).

Statistical analysis: In order to analyze the collected data, SPSS software (version 25, IBM Corporation, Armonk, NY, USA) was utilized. In this study, all covariance's assumptions like normal distribution were checked prior to statistical inference. Kolmogorov-Smirnov test (K-S test) was applied to confirm the normality of the data and the required pre-assumptions were also considered and confirmed. Multivariate analysis of covariance (MANCOVA) was conducted for assessing the effectiveness of the treatment on the experimental group compared to the control group. To compare the number of the participants and the mean age in experimental and control groups, chi-square test and independent t-test were applied.

Results

24 subjects participated in this study, whose demographic characteristics are presented in table 2 (P > 0.05). There was no significant difference in age and education level between the two groups.

Table 2. Demographic characteristics of the subjects

Parameters	Group		P-value
	Experimental	Control	
Grade			
Bachelor	4 (33.3)	4 (33.3)	0.46
MSc	6 (50.0)	7 (58.3)	0.21
PhD	2 (16.7)	1 (8.3)	0.32
Age (year)	22.83 ± 2.12	23.16 ± 1.85	0.67
Gender			
Male	7 (58.3)	8 (66.7)	0.23
Female	5 (41.7)	4 (33.3)	0.35

Data are presented as mean ± standard deviation (SD) or frequency and percentage
MSc: Master of Science; PhD: Doctor of Philosophy

Table 3 presents the mean and standard deviation (SD) of the intervention and control groups (P > 0.05). The results showed that MBCT was effective on the variables of subjective sleep quality, sleep latency, sleep disturbance, daytime dysfunction, and SIAS.

Table 3. Comparison of mean and standard deviation (SD) of target variables in the control and experimental groups

Sleep and anxiety parameters	Experimental group			Control group			P-value
	Pre-test	Post-test	Follow-up	Pre-test	Post-test	Follow-up	
Subjective sleep quality	2.58 ± 0.51	0.75 ± 0.45	0.63 ± 0.67	2.16 ± 0.83	1.66 ± 0.65	2.00 ± 0.73	0.001
Sleep latency	2.08 ± 0.66	1.25 ± 0.62	1.09 ± 0.70	1.33 ± 0.49	2.08 ± 0.99	2.16 ± 0.93	0.001
Sleep duration	1.91 ± 0.99	1.83 ± 0.93	0.90 ± 0.94	1.83 ± 0.93	2.25 ± 0.75	1.41 ± 0.99	0.580
Sleep efficiency	0.58 ± 0.51	0.41 ± 0.66	0.63 ± 0.67	0.50 ± 0.52	0.41 ± 0.51	0.58 ± 0.66	0.634
Sleep disturbance	2.41 ± 0.66	0.66 ± 0.77	1.36 ± 0.80	1.50 ± 0.52	2.50 ± 0.52	1.58 ± 0.79	0.017
Using sleep medication	1.16 ± 0.93	0.58 ± 0.99	1.00 ± 1.18	1.58 ± 0.90	1.50 ± 0.90	1.33 ± 0.77	0.306
Daytime dysfunction	2.25 ± 0.75	0.66 ± 0.77	0.72 ± 0.78	1.91 ± 0.99	2.33 ± 0.65	2.33 ± 0.65	0.003
SIAS	50.33 ± 3.57	45.83 ± 1.11	46.36 ± 1.12	51.66 ± 1.49	49.25 ± 1.21	49.33 ± 1.43	0.001

SIAS: Social Interaction Anxiety Scale

The results of Box's M test showed that the matrix of covariance was equal in MANCOVA ($P > 0.05$). Wilk's Lambda test that measures the efficacy of the treatment in all target variables showed that the linear combination of sleep quality and its components differed significantly between the control and experimental groups in the post-test stage (Wilk's Lambda = 0.166, P = 0.006, F = 6.481) and the follow-up (Wilk's Lambda = 0.193, P = 0.021, F = 4.780).

As table 4 shows, the results of univariate and multivariate covariance analysis showed that MBCT significantly improved subjective sleep quality, sleep latency, sleep disturbance, daytime dysfunction, and SIAS in the intervention group.

Table 4. Descriptive statistics and the effect of mindfulness-based cognitive therapy (MBCT) based on univariate and multivariate covariance analysis on target variables in the experimental group

Variable		F	P-value	Effect size
Post-test	Subjective sleep quality	20.654	0.001	0.579
	Sleep latency	13.688	0.001	0.477
	Sleep duration	0.399	0.580	0.021
	Sleep efficiency	0.236	0.634	0.015
	Sleep disturbance	7.283	0.017	0.327
	Using sleep medication	1.123	0.306	0.070
	Daytime dysfunction	13.121	0.003	0.467
	SIAS	45.510	0.001	0.684
Follow-up	Subjective sleep quality	10.826	0.005	0.436
	Sleep latency	9.208	0.009	0.397
	Sleep duration	0.761	0.398	0.052
	Sleep efficiency	0.876	0.365	0.059
	Sleep disturbance	8.533	0.011	0.379
	Using sleep medication	0.445	0.516	0.031
	Daytime dysfunction	14.600	0.002	0.510
	SIAS	26.607	0.001	0.571

SIAS: Social Interaction Anxiety Scale

Discussion

Current study indicated that MBCT could improve the symptoms of the experimental group patients compared to control group and these findings are in concordance with previous studies (38-41). Furthermore, according to the results of this study, MBCT could improve the quality of sleep in these patients and this finding is similar to what was concluded in previous studies noting that mindfulness increases sleep quality in patients who suffer from sleeping disorders (27-30). The explanation of this finding could be that mindfulness and mindfulness exercises probably keep the patients away from thoughts and ruminations at the threshold of sleep and this infuses peace to the patients which might obviate the lack of sleep and enhance sleep quality. On the other hand, the results of this study about the effect of this treatment on the aspects of sleep quality show that it improves the subjective aspects of sleep, along with its latency, disturbance, and daily dysfunction. Actually, mindfulness exercises lead to reduction of mental ruminations, worry (42), and anxiety (14) which are all major reasons of sleep deprivation and that is why mindfulness can improve sleep and weaken the relationship between limbic system and sleep problems (43).

In addition, according to sleep quality aspects' effect size, it can be concluded that mindfulness therapies normally affect the beginning and threshold of sleep, since these aspects are usually related to the beginning of sleep and are by far less effective on sleep continuity. This conclusion is to some extent in congruence with the study of Doos Ali et al. (44). However, investigating the other aspects of sleep revealed that mindfulness did not significantly affect the duration of sleep, taking sleep medications, or sleep efficiency. To explain these findings, it could be stated that as these aspects are normally affected by sleep's biological mechanisms compared to psychological ones, this intervention could not change them effectively. Furthermore, these aspects usually affect the continuity and duration of sleep, while mindfulness affects worry and anxiety which appear at the beginning of sleep (42).

The current research has some limitations which might have affected the generalizability of the study results. Firstly, the sample of the study consisted of university students who were diagnosed with SAD; therefore, generalizing the findings to people who suffer from other disorders has to be done cautiously. Secondly, the only data collection method in this study was using questionnaires. Thirdly, even though based on our findings, the treatment has been effective, the mechanism through which the intervention affects the variables is not clear. Future studies could examine the effectiveness of this intervention on larger populations of socially anxious people. In addition, more accurate tools such as electroencephalography (EEG), functional magnetic resonance imaging (FMRI), magnetic resonance imaging (MRI), and etc. could

be employed to assess the biological process of its effectiveness.

Conclusion

Mindfulness treatment could be used for improving sleep quality in patients with social anxiety. This treatment could also improve the aspects of sleep quality which are related to sleep threshold.

Conflict of Interests

Authors have no conflict of interests.

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