

The Effectiveness of the Cognitive Behavioral Group Therapy Based on Edinger and Carney's Protocol on Insomnia and Bedtime Procrastination in Patients with Insomnia

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Abstract

Background and Objective: Due to the high incidence of insomnia in students and its effects on physical and psychological health, the present study was conducted to investigate the effectiveness of cognitive behavioral group therapy (CBGT) on insomnia and bedtime procrastination in students.

Materials and Methods: The research sample consisted of 160 students of Zanjan University of Medical Sciences, Zanjan, Iran. Then, participants who scored > 15 in Insomnia Severity Index (ISI) and < 45 in Symptom Checklist-25 (SCL-25) were selected. ISI and Bedtime Procrastination Scale (BPS) were performed at three time intervals. Eight 90-minute sessions of CBGT were performed on the experimental group based on Edinger and Carney's protocol, and the control group received a booklet on sleep hygiene. The data were analyzed by repeated measures analysis of variance (ANOVA) and one-way analysis of covariance (ANCOVA).

Results: CBGT was significantly related to the reduced insomnia severity and bedtime procrastination. The difference between the two interventions in outcome variables showed that CBGT was significantly more effective than educational intervention in decreasing the rate of insomnia, but the difference between the two interventions was not significant in terms of bedtime procrastination. In other words, CBGT had a significant effect on study outcome and it was more effective than educational intervention.

Conclusion: Based on the Edinger and Carney's protocol, CBGT was effective in reducing insomnia severity, but it did not directly affect bedtime procrastination. It seems that the inclusion of modalities for addressing bedtime procrastination increases the effectiveness of this treatment specifically for insomnia in students.

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Introduction

Insomnia is defined as the difficulty in starting or continuing sleep and feeling uncomfortable after sleep. People with insomnia have enough mental activity to achieve adequate sleep (1). Insomnia is the most common type of sleep complaint and may be persistent or transient. Studies have reported a one-year prevalence of this disorder in adults between 30% and 45% (2, 3). The

findings have shown that sleeping hours in the general population have declined sharply in recent decades (3) and insomnia among young people, especially students, is a common problem (4-6); also the incidence of insomnia among students is increasing. Li et al. in a meta-analysis on 74 studies calculated a pooled prevalence of 25.7% among students (7). Jiang et al. also estimated that 18.5% of students had insomnia (8). Sing and Wong also reported the prevalence of insomnia among students to be 68.6% (9). Moayedi et al. in a study on the incidence of insomnia among students of Hormozgan University of Medical Sci-

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ences, Bandar Abbas, Iran, showed that among 400 participants in the study, 130 (38.2%) had a moderate and 24 (7.1%) had a high insomnia rate (10). The prevalence of insomnia varies among Iranian students, ranging as low as 9% to as high as 38% and 71% (11). Insomnia can have lasting and negative effects on daily activities of students, especially in their cognitive activities (12-15). It is believed that insomnia not only causes problems associated with well-being and poor mental functioning, but also can be a cause of depression and anxiety as well (16-19). The results of Barakat et al. showed that the prevalence of stress, anxiety, and depression was 63.7%, 66.9%, and 59.2% among students with insomnia, respectively (20). In addition, Taylor et al. in their research showed that insomnia could have problems such as daily fatigue, depression, anxiety, stress, low quality of life, and excessive use of sleep and stimulant medicines (21). Moreover, studies showed that students who had insomnia were more likely to use alcohol. Although there are concerns about insomnia in some age groups such as adolescents and the elderly, insomnia is less prevalent among students (14, 18). It seems that medical students are more likely to develop sleep disorders due to job stress and high work-educational load (4, 19, 22-24).

The commonly-used insomnia treatment is currently medical and psychotherapy, especially cognitive behavioral therapy (CBT) (25). Prescription drugs for insomnia include hypnotics (e.g., benzodiazepines), but it is recommended that these drugs should be used for up to 4 consecutive weeks and thereafter, an interruption should be given to reuse, resulting in insomnia recurrence (1, 2). CBT is a therapeutic approach in which a combination of behavioral and cognitive techniques is used to change the maladaptive behaviors associated with sleep and ineffective and illogical beliefs about sleep. Behavioral techniques include sleep hygiene, stimulus control therapy (SCT), and sleep restriction therapy (SRT). Cognitive techniques can also identify and reconstruct ineffective sleep-related thoughts, identify and replace the core beliefs associated with sleep, and change the cognitive structure of patients in relation to sleep (26). Studies have repeatedly shown the continuous improvement of sleep symptoms, including the number and duration of sleep awakening and latency with CBT. The short-term benefits of this treatment are similar to pharmacother-

apy, but the effects of CBT usually persist even 36 months post-treatment. With discontinuation of medication, insomnia is often reversed and sometimes accompanied by rebound, but CBT has less signs of relapse and there are no side effects of medications (27). Among non-pharmacological methods, CBT has clinical evidence of effectiveness for insomnia (27). The results of various studies have supported the effect of CBT on the improvement of insomnia (27). Research has also shown that CBT is also effective in individual, self-help (28), and teamwork format (29). Regarding the negative effects of insomnia on students' physical and psychological health, we decided to take steps to treat students' insomnia through cognitive behavioral group therapy (CBGT). Therefore, the present study sought to investigate the effectiveness of CBGT on insomnia and bedtime procrastination.

Materials and Methods

The research methodology was a clinical trial. The statistical population was all students of Zanjan University of Medical Sciences, Zanjan, Iran, amongst those, a sample of 160 was chosen and the following questionnaires were filled out: Insomnia Severity Index (ISI), Bedtime Procrastination Scale (BPS), and Symptom Checklist-25 (SCL-25).

The ISI, developed by Morin (1993), is a self-reporting tool that measures patient's perception of sleep. The ISI consists of seven items that measure difficulty to start sleeping, problems with the continuation of sleep (both nightly wake-ups and early morning wake-ups), current sleep satisfaction, interference with daily functioning, and significant damage to sleep; and the grade assesses the disturbance or anxiety caused by sleep problems. Participants estimate their perception of ISI items in a 5-point scale (0 = never and 4 = very high). Scores range from 0 to 28. Higher scores show more severe insomnia. Each ISI item shows the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV) insomnia criteria. The cut-off line for this index is as follows: 0-7 = insomnia is not clinically meaningful, 8-14 = clinical subtype, 15-21 = moderate clinical insomnia, 22-28 = severe clinical insomnia. Bastien *et al.* assessed the psychometric properties of this questionnaire in two samples of patients with insomnia. In the first study, the internal consistency of ISI for clinical patients presenting in a sleep

Table 1. Treatment plan

Sessions	Interventions
1. Sessions 1-2: assessment and psychoeducation	A. Conducting clinical interview and determining if the patient is a candidate for CBGT B. Reviewing the baseline sleep diary
2. Sessions 3-4: implementation of behavioral components	A. Explanation of the logic of treatment and the design of sleeping education B. Introduction of behavioral model of insomnia C. Calculation of the initial time prescribed for bedtime D. Setting up homework
3. Sessions 5-6: implementation of cognitive strategies	A. Reviewing and commenting on the results of a sleep diary indicating advancement and compliance with the recommendations B. Explaining cognitive logic to patient C. Discussion about constructive worries D. Discussion about method of thought record E. Setting up homework
4. Session 7-8: discussing relapse prevention	A. Recommendations for setting the time spent in bed B. Reviewing and strengthening adherence to treatment C. Problem resolving-behavioral component D. Problem resolving-cognitive strategies E. Checking the end of treatment

disturbance center with a complaint of insomnia was 0.74. The correlations of each item with the whole scale ranged from a low value of 0.36 (initial insomnia) to a high value of 0.67 (interference in function) with a mean of 0.54 (30).

A 9-item scale was developed to assess bed-time procrastination (Cronbach's $\alpha = 0.92$). Items were answered on a 5-point scale ranging from 1 (never) to 5 (always). An exploratory factor analysis (EFA) using principal component analysis (PCA) revealed a single-factor solution (eigenvalue = 5.57), indicating that the scale assesses a one-dimensional construct, as intended (31).

SCL-25 is a 25-item scale, which is based on the factor analysis method (SCL-90-R; Derogatis, Rickles, & Rock). The correlation between the 25-item scale and the original scale, SCL-90-Revised (SCL-90-R), is reported as 0.95 and the mean correlation coefficient between SCL-25 and nine subscales of SCL-90-R varies from about 0.80 to 0.95. This correlation suggests that, despite a decrease in the number of women, SCL-25 has the ability to investigate "general psychopathology"; the reliability of the questionnaire was investigated by the researchers in this research using a retest method. The obtained reliability coefficient is equal to 0.88. In terms of psychometric properties, the validity of the questionnaire was confirmed by Najarian and Davoodi in a group of 235 students from Tehran universities based on Cronbach's alpha of 0.74 (32).

Of those who had ISI scores above 15 and SCL-25 scores below 45, and those who had insomnia for at least one month, a sample of 32 participants was selected randomly and divided into two groups. In the next step and in the pretest, the BPS was performed. In order to implement CBT for insomnia, the Edinger and Carney's protocol was used as a group therapy for the experimental group in the form of an 8-week 90-minute intervention, and a sleep hygiene booklet was given to the control group to influence the cognitive domain (26). The general scheme of CBGT is presented in table 1. Inclusion criteria were: a score > 15 in ISI and willingness to participate in the study, and exclusion criteria included: absence more than 2 sessions in treatment and no participation in the triple assessment phases. 12 subjects (6 from CBGT and 6 from educational group) were omitted because of exclusion criteria. Finally, the data on 20 subjects were analyzed.

Results

Demographic properties: All the study participants were men. The age ranged from 19 to 28 years, and all of them were single. 85% of the participants lived in the dormitory and 15% were resident in their dwellings. 65% of the participants were from paramedical, 20% medical, 5% dentistry, and 10% nursing schools. 75% of the participants were undergraduate, 20% MSc, and 5% PhD students. The demographic characteristics of the subjects are presented in table 2.

Table 2. Demographic characteristics of study population in two groups

		Total	CBGT	Experimental
Age (year)		21.60 ± 2.16	22.80 ± 0.77	20.40 ± 0.26
Course	Undergraduate	15 (75)	6 (60)	9 (90)
	MSc	4 (20)	4 (40)	
	PhD	1 (5)		1 (10)
School	Medical	4 (20)	3 (30)	1 (10)
	Dentistry	1 (5)		
	Nursing/midwifery	2 (10)		2 (20)
Residency	Health/paramedical	13 (65)	7 (70)	7 (70)
	Dormitory	17 (85)	7 (70)	10 (100)
	Non-dormitory	3 (15)	3 (30)	

Mean ± standard deviation (SD) was reported for age and frequency (percent) was reported for other variables
 CBGT: Cognitive behavioral group therapy

The first question of the present study was the possibility and extend to which CBGT reduced the severity of insomnia. To answer this question, repeated measures analysis of variance (ANOVA) test was used. The independent variable was defined as a categorical variable including time at three intervals of pre-test, post-test and follow-up, and the dependent variable was defined as the severity of insomnia. The results of repeated measures ANOVA are presented in the following section (Table 3).

Table 3. Median and standard deviation (SD) of Insomnia Severity Index (ISI) in three time intervals

	Median	SD	N
ISI (pretest)	20.00	1.00	10
ISI (posttest)	6.80	2.29	10
ISI (follow up)	6.10	3.27	10

ISI: Insomnia Severity Index; SD: Standard deviation

Mauchly's test indicated violated sphericity assumption $\chi^2(5) = 9.31$, $P = 0.010$; therefore, degrees of freedom (DF) were corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon = 0.53$). The results of repeated measures ANOVA for comparing insomnia scores during pre-test, post-test and follow-up periods showed that an effect of time due to CBGT on insomnia was statistically significant (wilks's lambda = 0.046, $F(2,8) = 83.69$, $P < 0.010$), and the partial eta-squared was equal to 0.95, indicating that the effect size (ES) of treatment was very large.

Post-hoc tests using the Bonferroni correction revealed that the difference between the effect of treatment was significant from pre-test to post-test and follow-up, but the difference in the severity of insomnia from post-test to follow-up was not significant. In other words, after a month, the effect of treatment was stabilized (Table 4).

Table 4. Post-hoc test using Bonferroni correction for comparing different time intervals in Insomnia Severity Index (ISI)

		Interval	Mean difference	SE	P-value
ISI	Pretest	Posttest	13.20	1.03	< 0.010
		Follow up	13.90	1.38	< 0.010
	Posttest	Follow up	0.70	0.57	0.770

ISI: Insomnia Severity Index; SE: Standard error

The effectiveness of CBGT in reducing bedtime procrastination: The second question of the present research was the possibility and extend to which CBGT reduced the amount of bedtime procrastination. To answer this question, repeated measures ANOVA was used. The independent variable was defined as a categorical variable including time at three intervals of pre-test, post-test, and follow-up, and the dependent variable was defined as bedtime procrastination. The results are presented in the following section (Table 5).

Table 5. Median and standard deviation (SD) of Bedtime Procrastination Scale (BPS) in three time intervals

	Median	SD	N
BPS (pretest)	24.30	4.44	10
BPS (posttest)	21.60	3.16	10
BPS (follow up)	20.70	2.94	10

BPS: Bedtime Procrastination Scale; SD: Standard deviation

Mauchly's test indicated that the assumption of sphericity was not violated, $\chi^2(5) = 1.48$, $P = 0.470$. The results of repeated measures ANOVA for comparing bedtime procrastination scores in pre-test, post-test, and follow-up periods showed that the effect of time due to CBGT was statistically significant (wilks's lambda = 0.463, $F(2,8) = 4.64$, $P = 0.046$), and the partial eta-squared was equal to 0.54, indicating the medium ES.

Table 6. Post-hoc test using Bonferroni correction for comparing different time episodes in Bedtime Procrastination Scale (BPS)

		Interval	Mean difference	SE	P-value.
BPS	Pretest	Posttest	2.70	0.92	0.050
		Follow up	3.60	1.20	0.040
	Posttest	Follow up	0.90	0.88	> 0.999

BPS: Bedtime Procrastination Scale; SE: Standard error

Post-hoc tests using the Bonferroni correction showed that the difference in the effect of treatment from pre-test to post-test and follow-up was significant, but the difference in bedtime procrastination scores in post-test to follow-up was not significant; on the other hand, after a month, the effect of treatment remained stable (Table 6).

Comparison of the effectiveness of CBGT with educational intervention (sleep hygiene booklet): One-way analysis of covariance (ANCOVA) (Table 7) was used to compare the effectiveness of two CBGT and educational intervention in the dependent variables of insomnia severity and the bedtime procrastination during post-test and follow-up periods. This test allows the researcher to increase the power and sensitivity of the F-test to reduce the difference between the groups by controlling the effect of the diffraction variable on the dependent variables.

After modifying the means, the results indicated that there were significant differences between groups in severity of insomnia in the post-test (ISI = 214.90, $P < 0.001$, $\eta^2 = 0.927$) and follow-up (ISI = 112.22, $P < 0.001$, $\eta^2 = 0.686$). In the variable of the amount of bedtime procrastination in the post-test (ISI = 3.16, $P = 0.093$, $\eta^2 = 0.157$) and follow up (ISI = 1.52, $P = 0.234$, $\eta^2 = 0.082$), there was no significant difference between the two groups, but it was close to the post-test.

Discussion

The results of this study showed that CBGT based on the Edinger and Carney’s protocol could

reduce the rate of insomnia significantly. The ES of treatment on the severity of insomnia in the post-test phase was large, and these effects remained stable over a one-month follow-up period. This finding is in line with the results of Norell-Clarke et al. (33), Tang et al. (34), and Mottaghi et al. (35). Castronovo et al. conducted a research about the effect of CBGT on insomnia at San Rafael Hospital in Milan, Italy. The sample included 292 individuals including 66.7% men and 33.3% women. The CBGT used in that study was 7 sessions of 90 minutes with at least 8 and maximum 15 participation. Overall, in line with our findings, the results of the research showed that CBGT improved the insomnia. On the other hand, their research showed that those who used CBGT alone were more resistant to insomnia than those who took medication (36).

Research results show that CBGT is more effective than cognitive or behavior therapy alone. Harvey et al. conducted a study comparing the effects of behavior therapy, cognitive therapy, and CBGT on insomnia. Their sample included 188 adult patients. The results of their research showed that cognitive therapy led to gradual and continuous improvement, while behavior therapy improved rapidly and temporarily. On the other hand, CBGT was associated with an excellent and continuous improvement (37).

The second issue that we wanted to investigate in this study, and had not been addressed in any study, was the effectiveness of CBGT on reduction of bedtime procrastination.

Table 7. The results of analysis of covariance (ANCOVA) for cognitive behavioral group therapy (CBGT) and experimental groups

	CBGT	Experimental	F	P-value	ES
	Mean ± SD	Mean ± SD			
ISI (pretest)	20.00 ± 1.33	19.10 ± 2.18			
ISI (posttest)	6.87 ± 2.29	18.82 ± 0.87	214.90	< 0.001	0.927
ISI (follow up)	6.26 ± 3.47	18.74 ± 0.99	112.22	< 0.001	0.868
BPS (pretest)	24.30 ± 4.44	22.50 ± 4.47			
BPS (posttest)	20.95 ± 3.16	23.14 ± 4.92	3.16	0.093	0.157
BPS (follow up)	20.31 ± 2.94	22.28 ± 4.62	1.52	0.234	0.082

CBGT: Cognitive behavioral group therapy; ISI: Insomnia Severity Index; BPS: Bedtime Procrastination Scale; SD: Standard deviation; ES: Effect size

The results of this study showed that CBGT significantly reduced the amount of bedtime procrastination. The ES of treatment in the post-test phase was moderate in relation to bedtime procrastination and these effects remained constant over a one-month follow-up period. But the comparison of CBGT groups and educational intervention (38) was not statistically significant. It seems that there is no difference between the groups because of the educational content, which means that in this booklet, much of the educational materials refer to sleep hygiene, and especially the techniques for avoiding delay while going to bed; but in Edinger and Carney's protocol, these issues were less addressed. On the other hand, the Edinger and Carney's protocol was designed to treat insomnia and its focus has not been the bedtime procrastination. Bedtime procrastination is a new area in the research literature relating to insomnia, and yet there is no study specifically designed for reducing it. This research has limitations that should be generalized with caution to other studies accordingly. Participants were single men between ages of 19-28 years, mostly resident in dormitories.

Conclusion

The results of this study showed that CBGT based on Edinger and Carney's protocol could significantly reduce students' insomnia. But its effect on bedtime procrastination was modest and was not more effective than the participants who received an educational booklet for the sleep hygiene.

Conflict of Interests

Authors have no conflict of interests.

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