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Research article

Benson relaxation technique to address sleep quality and aggression among patients with bipolar type I disorder: A randomized clinical trial study

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ABSTRACT

Purpose: The present research was conducted to assess the effect of the Benson relaxation technique on sleep quality and aggression among patients with bipolar type I disorder.

Methods: This study was conducted using a randomized clinical trial design with the participation of 60 patients with bipolar type I disorder (30 participants in each group) in Mashhad, Iran (IRCT20220108053659N1). The intervention group received the Benson relaxation technique for 21 days in a row, twice a day (in the morning and evening), under the supervision of an expert psychiatric nurse (On the first day, instruction was given on implementing BRT. In the subsequent days of the intervention, the nurse stayed by the patient's bedside for the entire relaxation process). Aggression and sleep quality were assessed using the Buss-Perry Aggression Questionnaire and Pittsburgh Sleep Quality Index, respectively, before and one week after the completion of the intervention. Data were analyzed using descriptive and inferential statistics (Chi-squared, Fisher's exact test, independent sample *t*-test, and analysis of covariance).

Results: The participants in the present study were individuals of both genders aged 18 and above. Based on the results, both groups were homogeneous regarding demographic characteristics. Prior to the intervention, the two groups of control and intervention were not significantly different from each other in terms of sleep quality ($p = 0.870$) and aggression ($p = 0.961$). After the intervention, in an intergroup comparison, a significant difference was observed between the two groups in terms of the mean difference of aggression ($p < 0.001$) and sleep quality scores ($p < 0.001$).

Conclusion: Despite the favorable effect of this intervention, it is necessary to conduct more studies considering the broader aspects of interventions and related variables before including these interventions in the care plan of patients with bipolar type I disorder.

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1. Introduction

Bipolar disorder, a chronic mood disorder [1], contributes significantly to the global burden of disease, with five of the top 20 causes of disability attributable to mental illness being linked to bipolar disorder [2]. This disorder is characterized by severe mood swings and disruptions in psychological traits such as self-esteem, sleep patterns, and aggression [3,4]. Sleep disorders and aggression are common issues that can exacerbate other negative outcomes in individuals with bipolar disorder. The predominant symptom in bipolar disorder is insomnia, often accompanied by excessive daytime sleepiness, nightmares, challenges in falling or staying asleep, diminished sleep quality, sleep talking, sleepwalking, and obstructive sleep apnea [5]. Based on previous studies, sleep disorders in individuals with bipolar disorder are associated with a deterioration in cognitive function and a reduced likelihood of success in drug treatment [6].

Aggression is characterized by verbal or physical actions aimed at causing harm to others, animals, or objects, often without full awareness of the consequences by the aggressor [7,8]. In bipolar disorder, while aggression is commonly linked to manic symptoms, recent studies indicate that some individuals may continue to display aggressive behavior even after recovery. This aggression appears to be associated with a broader inclination towards impulsive reactions to emotional states, termed "emotion-related impulsivity" [9]. Such behavior not only poses risks to the safety of patients and staff but also prolongs hospitalization durations [10].

Medication is typically regarded as the primary treatment for bipolar disorder. Studies have shown that combining medication with psychotherapies yields favorable outcomes in determining the prognosis of the disease. However, complementary therapies can assist patients in adopting self-management strategies to enhance disease outcomes [11,12]. Conversely, while psychopharmacology is the predominant approach in addressing aggression alongside sleep and anger disorders, complementary and alternative methods should be considered when the drug's side effects are a concern [13,14].

Complementary treatments utilized for severe psychiatric conditions encompass various approaches such as light therapy, yoga, herbal treatments, nutritional supplements, music therapy, and relaxation [15,16]. Relaxation serves as an intervention that regulates the physiological activity of different body systems [17]. Benson's relaxation technique (BRT), introduced by Benson and Klipper in 1975, stands as one of the most renowned relaxation methods. It entails selecting a focused word or phrase, closing the eyes, and relaxing the muscles. The individual silently repeats the word while maintaining a passive demeanor. Following 10–20 min, the individual sits quietly before repeating the process while standing [18]. Based on current knowledge, the repeated use of BRT to enhance sleep quality has been documented. Generally, a favorable effect has been consistently reported in this context [19–21]. However, studies investigating its impact on aggression have been limited [22]. Additionally, a review of the literature has shown that relaxation-based interventions have positive effects on various aspects of mental health, including aggression, state anxiety, stress, and subjective well-being, among individuals with psychiatric disorders [16,23,24]. It is noteworthy that improving sleep quality and alleviating aggression symptoms during the patient's recovery process are crucial. Therefore, implementing interventions such as BRT

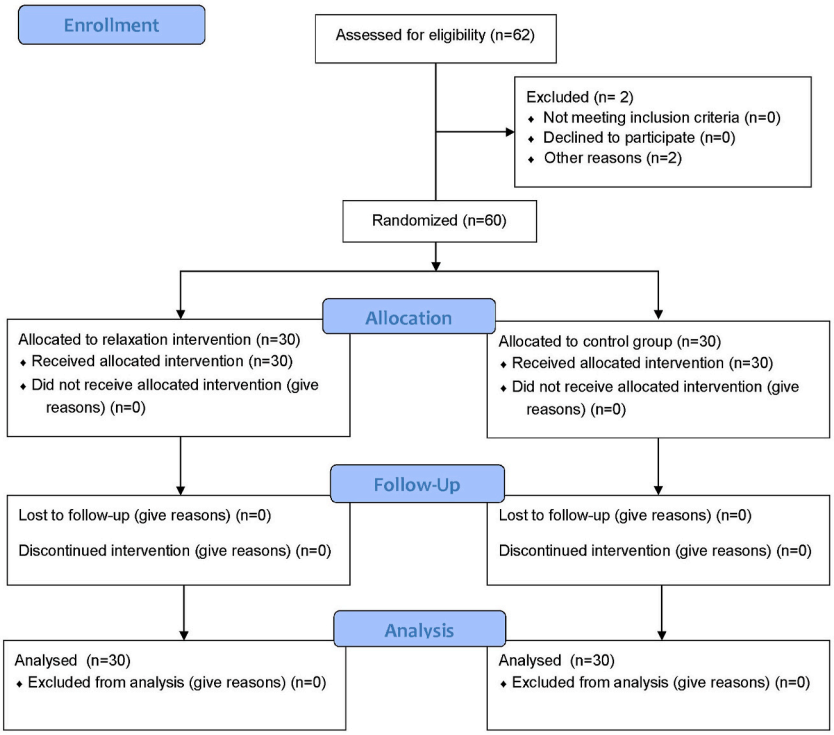

Fig. 1. The flow diagram of the study.

as a complementary treatment approach is deemed necessary and imperative. Given the limited number of studies in this area, this study aimed to assess the effectiveness of BRT on sleep quality and aggressive symptoms in patients with bipolar disorder type I. It was hypothesized that this intervention would reduce aggressive symptoms and improve sleep quality in these individuals.

2. Materials and methods

2.1. Study design

This randomized controlled trial study was conducted using a parallel design from March 6, 2023, to July 24, 2023.

2.2. Participants

The current study involved 60 participants diagnosed with type I bipolar disorder at Ibn-sina psychiatric hospital, the largest psychiatric hospital in northeastern Iran. Inclusion criteria comprised a confirmed diagnosis of bipolar disorder type I by a psychiatrist, age between 18 and 60 years, a Pittsburgh Sleep Quality Questionnaire (PSQI) score exceeding 5, a Bass and Perry Aggression Questionnaire (BPAQ) score exceeding 75, and non-participation in other interventions. Exclusion criteria included the presence of psychotic symptoms or significant physical disorders that hindered attendance at meetings.

The duration of hospitalization for patients in this study varied depending on their mental conditions and treatment progress. However, as a standard practice, the hospitalization period was generally set at six weeks. Eligible participants were divided into intervention and control groups using a four-block random allocation method. Random allocation sequences were generated using SPSS software. The random allocation sequence was securely maintained as confidential within opaque sealed envelopes, and it remained undisclosed to individuals engaged in data collection, participant recruitment, and the statistical consultant. At the outset of the study, two participants were excluded due to excessive excitement and an inability to effectively communicate. Subsequently, the remaining participants were randomly assigned to either the intervention or control groups. Following random allocation, no further participants were excluded from the study. The participants in the intervention group demonstrated full compliance in receiving the intervention throughout the study implementation (Fig. 1).

2.3. Measures

To conduct the study, we employed a demographic information form, the Buss and Perry Aggression Questionnaire (BPAQ), and the Pittsburgh Sleep Quality Index (PSQI), all of which were completed during interviews with the participants.

2.4. Demographic characteristics form

The demographic characteristics form encompassed variables such as age, gender, literacy level, employment status, marital status, duration of illness, number of hospitalizations, family history of illness, age of onset of illness, and medication history.

2.5. Buss Perry Aggression Questionnaire (BPAQ)

This questionnaire assesses four types of aggressive behavior: physical aggression, verbal aggression, anger, and hostility. It employs a 5-point Likert scale across 29 items to evaluate aggression. The total aggression score is derived from the sum of the subscale scores, with higher scores indicating greater aggressiveness. The questionnaire demonstrates acceptable reliability, with test-retest coefficients ranging from 0.72 to 0.80 for the four subscales. To assess the internal consistency of the scale, Cronbach's alpha was utilized, yielding values of 0.82 for physical aggression, 0.81 for verbal aggression, 0.83 for anger, and 0.80 for hostility [25]. The test-retest coefficient for this questionnaire was determined to be 0.78, indicating good reliability. Additionally, Cronbach's alpha coefficients ranging from 0.70 to 0.83 further demonstrate the reliability of this tool [26]. In the present study, the questionnaire's reliability was assessed using the internal consistency method, yielding a Cronbach's alpha coefficient of 0.70.

2.6. Pittsburgh Sleep quality index (PSQI)

This tool assesses sleep quality over the past month and comprises 18 items. It evaluates subjective sleep quality, sleep onset latency, sleep duration, sleep disturbances, use of sleep medication, and daytime dysfunction. Each of the questionnaire's 7 subscales assigns scores ranging from 0 to 3 (none = 0, mild = 1, moderate = 2, severe = 3), with total scores ranging from 0 to 21. Higher scores indicate poorer sleep quality, with a total score higher than 5 indicating poor sleep quality [27]. Previous studies have examined the psychometric properties of the Persian version of this questionnaire, confirming its validity and reliability, with a sensitivity of 100 % and specificity of 93 %. Reliability was assessed using Cronbach's alpha coefficient, yielding values of 0.89 and 0.84 at an optimal level [28,29]. The current study also demonstrated good reliability, with a Cronbach's alpha coefficient estimated at 0.92.

The data collection tools were completed in two stages before and one week after the completion of the intervention. Data collection by questionnaire from each patient took an average of 15 min.

2.7. Intervention

After obtaining the required permissions, intervention sessions based on BRT were held at the general psychiatric wards of the Ibn-sina Psychiatric Hospital, Mashhad, Iran. The main goal of the BRT is to alleviate symptoms of aggression and improve the levels of sleep quality in the present study. BRT is implemented so the person chooses a focused word or short phrase based on his belief system. After being in a quiet place, the person closes his eyes and relaxes all his muscles. Then, as you slowly breathe while exhaling, he repeats the desired word or phrase silently. Meanwhile, the person has a passive attitude. If disturbing thoughts arise, he passes them by simply. This process may take 10–20 min. It depends on the conditions. After completing these steps, he sits quietly for about a minute with his eyes closed and then with his eyes open, and this process is repeated in a standing position. On the initial day of the intervention, the nurse instructed the patient on relaxation techniques (the implementation of the intervention in this study was performed by the first author, who is an expert psychiatric nurse). Subsequently, on the succeeding days, the patients initiated the implementation of relaxation procedures in the presence of the nurse in a quiet environment and away from environmental stimuli for half an hour in a controlled manner, following prearranged schedules coordinated between the nurse and the patients. To mitigate potential issues arising from abrupt changes in the patient's condition, the nurse remained in the designated intervention room until the patient's relaxation process was successfully concluded. During the patient's relaxation, no interaction occurred between the nurse and the patient.

Benson's relaxation training was administered individually to each patient. Following the training, patients were instructed to practice the BRT steps in the researcher's presence while listening to audio guidance through headphones. The researcher tailored the educational materials to the patient's educational level and learning capacity, providing thorough explanations. The intervention consisted of face-to-face sessions with patients conducted over 21 consecutive days, occurring twice daily in the morning and evening. Given that the vaccination rollout in Iran occurred after that of some other countries, particular precautions for COVID-19 prevention needed to be observed in medical facilities during the study period. So, intervention sessions were held according to the observance of health protocols and social distancing and provided personal protective equipment for study participants. All of the information on intervention was provided based on the TIDieR checklist used for reporting and reproducibility [30]. In the control group, people received the routine interventions of the treatment center, such as psycho-pharmacotherapy, psychotherapy, psychosocial support (e.g., social work), and rehabilitation (e.g., providing group-based psychiatric interventions and occupational therapy). In this study, all participants were received combinations of medication and psychotherapy.

2.8. Sample size

Based on the study by Rambod et al. (2013), and considering a 95 % confidence interval and 80 % test power for calculating the mean difference score of sleep quality, the sample size for the current study was estimated to be 62 individuals (31 per group) [31].

2.9. Blinding

In this study, due to the nature of the intervention, patients could not be blinded. However, the statistical analyst and data collector were unaware of the allocation of individuals to the intervention and control groups.

2.10. Data analysis

The data were analyzed using descriptive statistics (percentage, frequency, mean, and standard deviation). Chi-squared and Fisher's exact tests were employed to assess differences in qualitative characteristics (e.g., gender, education, marital status) between the two groups. Additionally, independent sample t-tests were utilized to examine differences in mean scores (e.g., aggression, sleep quality, subscales, and other quantitative variables) between the control and intervention groups. Furthermore, analysis of covariance (ANCOVA) was conducted to compare aggression, and sleep quality scores between the control and BRT groups post-intervention, while controlling for confounding variables (e.g., pretest score and group factors). A significance level of 0.05 was applied for all statistical tests.

2.11. Ethical considerations

The present study was approved by the ethics committee of Mashhad University of Medical Sciences (IR.MUMS.NURSE.REC.1400.069) and Iranian Registry of Clinical Trials system (IRCT20220108053659N1). Before starting the study, the implementation method was explained to all participants and their families, and they were assured that their information would be kept confidential. Informed consent was obtained from the patients and their families verbally and in writing. They were also informed that they could withdraw from the study anytime. After the completion of the study, the intervention was also implemented for the control group (if the patient was hospitalised, the intervention was implemented as above, and in the case of discharge, the necessary training for relaxation was provided to their families).

3. Results

The participants in the current study were individuals of both genders aged 18 and above. Approximately two-thirds of all

participants, constituting 39 patients, were male. The results of the present study showed that the participants in the two intervention (N = 30) and control (N = 30) groups had no significant differences in demographic variables, including age, marital status, educational level, and employment status ($p > 0.05$). Additional results are presented in Table 1.

According to the independent sample *t*-test, there was no significant difference observed between the control and BRT groups in the mean aggression scores before the intervention ($p = 0.961$). However, after the intervention, a significant difference was observed between the two groups, such that the mean aggression score in the BRT group was significantly lower than the control group ($p = 0.011$). Also, the difference in the mean scores of aggression in the two intervention and control groups had a significant difference. In the intervention group, there was a greater decrease in aggression scores after the intervention (M = −11.5, SD = 7.8 vs. M = −2.0, SD = 4.0). In addition, the current study showed that the implementation of BRT, as a complementary intervention, is effective in significantly reducing verbal aggression ($p = 0.036$), physical aggression ($p = 0.017$), hostility ($p = 0.017$), and anger ($p < 0.001$) (as factors of aggression) (Table 2).

According to the study's inclusion criteria, which required participants to score higher than 5 on the PSQI, all individuals in both groups exhibited poor sleep quality before the intervention. Following the intervention, Fisher's exact test results revealed that three participants achieved good sleep quality, all of whom were from the intervention group. Conversely, none of the participants in the control group reported experiencing good sleep quality post-intervention (p = 0.24). In addition, the average score of the total quality of sleep before the intervention did not differ significantly between the two groups ($p = 0.870$). After the intervention, the score obtained in the intervention group was significantly lower than the other group ($p < 0.001$). On the other hand, a significant difference was observed in the mean sleep quality scores between the two groups. While the intervention group showed a decrease in sleep quality scores, the control group exhibited a significant increase (M = 2.5, SD = 2.6 vs. M = 2.1, SD = 0.6). Also, based on the presented results, some of the subscales of PSQI have been improved following the BRT, such as subjective sleep quality ($p < 0.001$), sleep duration ($p = 0.005$), and sleep latency ($p < 0.001$). In other subscales, significant changes were not observed ($p > 0.05$) (Table 3).

Additionally, based on the results presented in Table 4, the factors influencing aggression scores and sleep quality after the intervention were evaluated using analysis of covariance (ANCOVA). The findings indicated that the mean aggression score before the intervention and the group variables had a significant effect on the mean aggression score after the intervention. Patients in the control group reported a significantly higher aggression score of 9.522 points compared to the BRT group after the intervention. Similarly, the sleep quality score before the intervention and the group variables influenced sleep quality score after the intervention. In the intervention group, the sleep quality score was significantly lower by 3.172 units compared to the control group.

4. Discussion

This study aimed to assess the effectiveness of BRT in reducing aggression symptoms and improving sleep quality in patients with bipolar type I disorder (BID). The findings revealed that BRT effectively enhanced sleep quality and alleviated aggression symptoms in

Table 1
Demographic information of patients with bipolar type I disorder.

Variables		Groups		P-value
		Intervention (n = 30)	Control (n = 30)	
		n (%)	n (%)	
Gender	Male	19 (63.3)	20 (66.7)	0.787[a]
	Female	11 (36.7)	10 (33.3)	
Marital status	Single	22 (73.3)	20 (66.7)	0.573[a]
	Married	8 (26.7)	10 (33.3)	
Level of education	Illiterate	1 (3.4)	4 (13.4)	0.294[a]
	Secondary school	7 (23.3)	10 (33.3)	
	High school	16 (53.3)	10 (33.3)	
	Academic degree	6 (20.0)	6 (20.0)	
Employment status	Housewife	5 (16.7)	7 (23.3)	0.383[a]
	Unemployed	8 (26.7)	3 (10.0)	
	Retired	1 (3.3)	2 (6.7)	
	Employee	12 (40.0)	16 (53.3)	
	Student	4 (13.3)	2 (6.7)	
Family history of psychiatric disorders	Yes	21 (70.0)	22 (73.3)	0.774[a]
	No	9 (30.0)	8 (26.7)	
History of drug abuse	Yes	17 (56.7)	21 (70.0)	0.284[a]
	No	13 (43.3)	9 (30.0)	
		Mean ± SD	Mean ± SD	
Age (year)		31.9 ± 8.1	32.4 ± 9.4	0.802[b]
Duration of disease (year)		5.6 ± 5.3	7.6 ± 6.4	0.199[b]
Number of hospitalizations		2.8 ± 1.9	3.8 ± 4.4	0.251[b]

n: Number; %: Percent; SD: Standard deviation.
[a] Chi-squared test.
[b] Independent *t*-test.

Table 2
Mean Scores of aggression and its subscales before and after the intervention in both groups.

Variables		Groups		p^a
		Intervention (n = 30)	Control (n = 30)	
		Mean ± SD	Mean ± SD	
Physical aggression	Pre-intervention	30.2 ± 7.1	29.9 ± 5.6	0.840
	Post-intervention	26.7 ± 6.9	28.7 ± 5.6	0.217
	Mean Differences	−3.5 ± 3.6	−1.2 ± 3.8	0.017
Verbal aggression	Pre-intervention	14.8 ± 5.1	15.4 ± 3.2	0.613
	Post-intervention	13.2 ± 4.9	15.1 ± 2.7	0.060
	Mean Differences	−1.6 ± 2.9	−0.3 ± 2.1	0.036
Anger	Pre-intervention	23.6 ± 5.0	24.2 ± 4.6	0.608
	Post-intervention	20.0 ± 6.2	24.1 ± 4.6	0.005
	Mean Differences	−3.6 ± 3.2	−0.1 ± 2.3	<0.001
Hostility	Pre-intervention	26.0 ± 5.4	24.6 ± 4.5	0.281
	Post-intervention	22.9 ± 4.7	24.1 ± 4.2	0.302
	Mean Differences	−3.1 ± 4.0	−0.5 ± 4.2	0.017
Total	Pre-intervention	94.2 ± 15.7	94.1 ± 10.4	0.961
	Post-intervention	82.7 ± 16.8	92.1 ± 9.7	0.011
	Mean Differences	−11.5 ± 7.8	−2.0 ± 4.0	<0.001

n: Number; P: P-value; SD: Standard deviation.
[a] Independent *t*-test.

Table 3
Sleep quality and its dimensions before and after the BRT.

Variables			Groups		p^a
			Intervention (n = 30)	Control (n = 30)	
			Mean ± SD	Mean ± SD	
Subjective sleep quality	Pre-intervention		1.7 ± 0.9	1.6 ± 0.7	0.873
	Post-intervention		0.8 ± 0.6	1.7 ± 0.7	<0.001
	Mean Differences		−0.9 ± 0.8	0.1 ± 0.7	<0.001
Sleep duration	Pre-intervention		1.4 ± 1.2	1.5 ± 1.2	0.523
	Post-intervention		0.7 ± 1.0	1.4 ± 1.1	0.006
	Mean Differences		−0.7 ± 0.8	−0.1 ± 0.7	0.005
Sleep disturbances	Pre-intervention		1.6 ± 0.8	1.3 ± 0.7	0.154
	Post-intervention		1.5 ± 0.7	1.2 ± 0.6	0.116
	Mean Differences		−0.1 ± 1.0	−0.1 ± 0.6	0.999
Daytime dysfunction	Pre-intervention		1.5 ± 1.1	1.9 ± 1.0	0.195
	Post-intervention		1.3 ± 1.1	2.0 ± 1.0	0.009
	Mean Differences		−0.2 ± 0.8	1.0 ± 0.7	0.064
Sleep latency	Pre-intervention		2.4 ± 1.0	2.2 ± 0.9	0.331
	Post-intervention		1.9 ± 1.1	2.5 ± 0.6	0.011
	Mean Differences		−0.5 ± 0.7	0.3 ± 0.7	<0.001
Sleep efficiency	Pre-intervention		1.1 ± 1.1	1.1 ± 1.1	0.907
	Post-intervention		0.9 ± 1.1	1.0 ± 0.9	0.600
	Mean Differences		−0.2 ± 0.9	−0.1 ± 0.7	0.641
Sleep medication	Pre-intervention		2.7 ± 0.8	2.7 ± 0.8	0.875
	Post-intervention		2.5 ± 0.8	2.9 ± 0.3	0.027
	Mean Differences		−0.2 ± 1.1	0.2 ± 0.8	0.187
Total score	Pre-intervention		12.2 ± 3.1	12.3 ± 3.1	0.870
	Post-intervention		9.6 ± 3.6	12.9 ± 2.4	<0.001
	Mean Differences		−2.6 ± 2.5	0.6 ± 2.1	<0.001
			n (%)	n (%)	
Sleep quality	Pre-intervention	Poor	30 (100.0)	30 (100.0)	
		Good	0 (0.0)	0 (0.0)	
	Post-intervention	Poor	27 (90.0)	30 (100.0)	
		Good	3 (10.0)	0 (0.0)	

n: Number; %: Percent; P: P-value; SD: Standard deviation; BRT: Benson Relaxation Technique.
[a] Independent *t*-test.

patients with bipolar I disorder BID. To our knowledge, no prior research has examined the efficacy of this relaxation technique specifically in the context of bipolar I disorder (BID).

This study demonstrated that BRT significantly decreased aggression symptoms, including verbal and physical aggression, hostility, and anger in patients with BID. Consistent with these findings, Salehipour et al. (2021) reported that implementing BRT twice daily for

Table 4
Effect of BRT on aggression and sleep quality after eliminating the effect of pre-test mean scores.

Variables			β	SE	t	P-value
Aggression	Constant value		−4.942	5.902	−0.837	0.406
	Mean score of before intervention		0.930	0.061	15.138	<0.001
	Group	Intervention	ref			
		Control	9.522	1.608	5.921	<0.001
Sleep quality	Constant value		0.946	1.147	0.824	0.413
	Mean score of before intervention		0.711	0.089	8.015	<0.001
	Group	Intervention	ref			
		Control	3.172	0.548	5.784	<0.001

BRT: Benson Relaxation Technique; SE: Standard error.

12 weeks led to a significant reduction in aggression and anxiety symptoms in patients with beta-thalassemia major [22]. Moreover, İçel and Başoğul (2021) conducted a study examining the effects of progressive muscle relaxation and music therapy on anger symptoms in patients with chronic mental disorders, finding that this combined intervention effectively reduced anger levels in participants [16]. Additionally, Lee and DiGiuseppe (2018) conducted a meta-analysis investigating the effects of relaxation-based methods on aggression and anger symptoms across various populations, which revealed a significant reduction in the severity of aggression and anger following these interventions [32]. Based on the author's viewpoint, by practicing relaxation, individuals may be better able to manage their emotions and prevent them from escalating into hostile behaviour's. Additionally, relaxation can promote inner peace and well-being, which may help individuals approach challenging situations with a more positive and open mindset, reducing the likelihood of responding with hostility [33].

Vancampfort et al. (2011) conducted a study to investigate the effects of progressive muscle relaxation on state anxiety, stress, and subjective well-being in patients with schizophrenia. The study revealed that this intervention significantly reduced state anxiety and stress symptoms while enhancing subjective well-being among participants [23]. Additionally, Bellemans et al. (2019) conducted a systematic review examining the effects of body-oriented psychomotor therapy, which incorporates progressive relaxation and meditation, on aggressive behaviors in individuals with borderline personality disorder. The review suggested that this therapeutic approach holds promise for managing and reducing aggression in this population [24]. One important consideration is the relationship between cortisol levels and arousal, which are predictors of aggression. Relaxation may influence the secretion of oxytocin and cortisol hormones in individuals, providing a potential explanation for the observed effects [34,35]. Another potential explanation for the efficacy of relaxation on physical and verbal aggression is that relaxation techniques can help to reduce stress and anxiety. When individuals are able to manage their stress levels, they may be less likely to react with physical or verbal aggression in response to challenging situations [36,37]. Additionally, relaxation techniques can help individuals develop greater self-awareness and emotional regulation, allowing them to control their impulses better and respond to conflict in a more calm and measured manner [38,39].

Based on the study findings, the application of relaxation techniques following the Benson method has resulted in enhanced sleep quality among individuals with BID. Numerous studies have illustrated the efficacy of this intervention in enhancing sleep quality across diverse population groups. Previous research has indicated that the implementation of such techniques has led to improved sleep quality in different populations, including older adults, surgical technicians, parents of children with leukemia, patients with chronic kidney failure, individuals undergoing chemotherapy for cancer, patients with systolic heart failure, and those undergoing coronary artery bypass graft surgery [19,21,31,40–42]. The efficacy of BRT in improving sleep quality can be attributed to several factors (e.g., activation of the relaxation response, stress reduction, and improved sleep routine and rituals). Engaging in relaxation exercises triggers the body's relaxation response, promoting a state of calmness and reducing physiological arousal. This can help counteract the heightened arousal and stress that often interfere with sleep [43]. In addition, Relaxation techniques are effective tools for reducing stress and anxiety, which are common contributors to sleep disturbances. When individuals engage in relaxation exercises, it helps to lower stress levels and alleviate the racing thoughts that may keep them awake at night [44]. Furthermore, relaxation techniques before bedtime can help establish a calming routine and signal to the body that it's time to wind down and prepare for sleep [45].

Moreover, the current research findings indicate that BRT enhanced subjective sleep quality and sleep duration, and reduced sleep latency. These findings are consistent with previous studies [20,31,42]. It should be kept in mind that relaxation techniques have a positive effect on the mental aspects of health such as subjective sleep quality. On the other hand, in addition to the previous reasons, BRT can lead to better compliance with sleep hygiene and regulating the sleep-wake cycle [46]. Therefore, sleep duration and sleep latency are expected to improve after BRT.

Despite the limitations of the existing research on the effectiveness of complementary medicine interventions for mental disorders, some studies have reported the positive effect of relaxation-based interventions on sleep quality-related aspects. For example, the results of the study of İçel and Başoğul (2021) showed that the implementation of progressive muscle relaxation along with music therapy was significantly effective in improving the quality of sleep among patients with chronic mental disorders [16]. On the other hand, based on the results of previous studies performing music relaxation significantly improves emotional measures and reduces insomnia symptoms in patients with schizophrenia [47,48]. A possible explanation for enhancing the overall quality of sleep and some of its subscales in this study could be due to the effect of relaxation techniques on reducing anxiety and stress, which were not evaluated in the present study. In addition, specific chemical changes in the blood associated with relaxation exercises, such as reduced levels of adrenal hormones, may improve sleep quality. In addition, relaxation techniques help manage stress, improve mental

well-being, and ignore distracting thoughts, as shown in previous studies [49–51].

This study was subject to several limitations that warrant caution in interpreting the findings. The sample of this study was recruited from a psychiatric referral hospital in northeastern Iran, which may limit the external validity of the results. The effectiveness of BRT on sleep quality and aggression was measured only at two time points: pre-intervention and post-intervention. So, future studies should assess the long-term effects of BRT on sleep quality and aggression at different time intervals. This study did not include objective measures of sleep quality, therefore only relying on subjective measure indicators. This study did not investigate some variables that may influence aggression and sleep quality (such as impulsivity and anxiety), which should be considered in future research. Also, the type of medication was not evaluated because, during the study process, the patient's medication orders were constantly being adjusted based on the psychiatrist's opinions. This study has important implications for advancing the current level of psychiatric nursing knowledge despite the limitations and the scarcity of related studies in the context of psychiatric patients. The results of this study may draw the attention of researchers to the potential benefits of BRT for improving sleep quality and reducing aggression among psychiatric patients.

5. Conclusion

The present study shows the favorable effect of BRT implementation to improve sleep quality and reduce aggression symptoms in patients with BID. It is recommended that future studies address the limitations of the present study and assess the efficacy of BRT on other related variables to sleep quality and aggression in the context of psychiatric patients. Despite the significant results showing the effectiveness of BRT, it is necessary and recommended to conduct further studies considering the broader aspects of interventions and related variables before including these interventions in the care plan of patients with BID.

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Ethics approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. All participants and their families provided informed consent to participate in the study. This study was reviewed and approved by the Ethics Council of Mashhad University of Medical Sciences, with the approval number: IR.MUMS.NURSE.REC.1400.069.

Consent to participate

Informed consent was obtained from all individual participants included in the study. Research objectives, confidentiality, risks and potential benefits were presented to participants in online forms. Researchers also provided contact information to support participants in asking questions and to facilitate withdrawal.

Data availability statement

Information will be available upon request from the corresponding author.

CRediT authorship contribution statement

Mohamad Gharehbaghi: Writing – original draft, Methodology, Data curation, Conceptualization. **Seyedmohammad Mirhosseini:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Somaye Minaei Moghadam:** Writing – review & editing, Writing – original draft, Investigation, Data curation. **Maryam Salari:** Writing – review & editing, Methodology, Formal analysis, Conceptualization. **Samuel Grimwood:** Writing – review & editing, Methodology, Investigation, Conceptualization. **Saeed Vaghee:** Writing – review & editing, Supervision, Project administration, Methodology, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2024.e30648.

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