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Effectiveness of mindfulness-based stress reduction on emotion regulation and test anxiety in female high school students

Shokooh Shahidi, Hossein Akbari¹, Fatemeh Zargar²

Abstract:

BACKGROUND: Test anxiety is one of the most disabling disorders and annual school academic performance will affect millions of students. Hence, it needs attention and treatment. Therefore, this research aimed to examine the effectiveness of a mindfulness-based stress reduction (MBSR) therapy on emotion regulation and test anxiety of students and test the remaining effect of this treatment after 3 month.

METHODS: Sample size of fifty participants randomly divided into experimental (MBSR) and control groups. The MBSR training interventions were implemented to the experimental group, in eight weekly sessions using MBSR manual by John Kabat-Zinn (2013). Participants in both groups were evaluated using the Test Anxiety Scale and the Cognitive Emotion Regulation Questionnaire. The study findings were analyzed using analysis of variance with repeated measures.

RESULTS: The result shows that the MBSR program has had continuous significant effects on test anxiety ($P < 000$) and emotion regulation ($P < 000$) but was not significant only for the self-blame subscale ($P = 0.126$).

CONCLUSIONS: The study results indicated that the effects of MBSR lasted through the follow-up, for both of these variables. Using the results of this study may be proposed school counselors use mindfulness to reduce the anxiety of their pupils.

Keywords:

Emotion regulation, mindfulness-based stress reduction, test anxiety

Introduction

In the process of development, children and adolescents experience a broad spectrum of anxieties, which are sometimes so powerful that can create problems in their daily life and education. Among these anxieties, test anxiety is a common problem.^[1] Test anxiety is a type of performance anxiety that their reasons are fear of failure, lack of preparation, bad experiences of examination, and can cause physical, emotional, cognitive-behavioral symptoms in person.^[2] Test anxiety is a

global issue, and every year, affects the academic performance of millions of students worldwide.^[3] Previous studies have reported a prevalence rate of 10%–30% for test anxiety in students.^[4] In Iran, a prevalence rate of 17.2% has been reported for test anxiety.^[5] With an increase in age and level of education, test anxiety increases. In addition, test anxiety is more prevalent in female students than male students.^[6]

Test anxiety is associated with emotion regulation strategies. Previous studies indicate that emotion regulation strategies can predict anxiety in high school students and are positively related to test anxiety.^[7]

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Departments of
Clinical Psychology
and ¹Biostatistics,
Kashan University of
Medical Sciences,
Kashan, ²Department
of Biostatistics, Isfahan
University of Medical
Sciences, Isfahan, Iran

Address for correspondence:

Dr. Fatemeh Zargar,
Isfahan University of
Medical Sciences,
Isfahan, Iran.
E-mail: fatemehzargar@
gmail.com

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Emotion regulation can have positive effects on a person's adjustment to their environment, can improve a person's satisfaction with their performance, and is also an important factor in reducing anxiety.^[8]

Until now, numerous psychological interventions have been used for test anxiety, including muscle relaxation and systematic desensitization, cognitive-behavioral therapies, and Ellis's rational emotive theory.^[9] All these therapies, especially behavioral therapies,^[10] have been partly effective in reducing test anxiety; however, there have been few studies examining the new generation of behavioral therapies, such as mindfulness-based stress reduction (MBSR).

MBSR has been shown to be highly effective in the treatment of some clinical disorders and physical conditions.^[11] It has also been found that MBSR can be helpful in keeping anxiety symptoms in a balanced level in people with anxiety disorders such as test anxiety.^[12-15]

However, Toneatto and Nguyen reviewed any study that was published in a peer-reviewed journal, used a control group, and reported outcomes related to changes in depression and anxiety by MBSR. They found out when active control groups were used, MBSR did not show an effect on depression and anxiety. Adherence to the MBSR program was infrequently assessed. Beside this, they urged that MBSR does not have a reliable effect on depression and anxiety.^[16]

Moreover, there is no research to consider the effectiveness of MBSR on test anxiety and emotion regulation using a questionnaire related to these two variables.

Based on these reasons, the present study is aimed to examine the effectiveness of a MBSR therapy on emotion regulation and test anxiety of students and test the remaining effect of this treatment after 3 month with the related questionnaires.

Materials and Methods

Methods

This is a randomized clinical trial with a control group, conducted in the academic year 2014–2015, from September to late November, in Golpayegan, Iran. Before conducting the research, we obtained the approval of the Research Ethics Committee of the Kashan University of Medical Sciences (IRCT No: 2015061122657N1). The statistical population consisted of all students of the high schools for female students in Golpayegan. A sample size of fifty participants was determined using the Cochran's formula. Participants were selected using a multistage cluster sampling method. In the first stage, two high schools were selected from all high schools in Golpayegan. In the second stage, six classrooms

were selected from grades one to three. Then, the Test Anxiety Scale (TAS) was randomly administered to 200 students. Finally, a total of 50 students with a score above 13 in TAS with the lack of diagnostic criteria for other disorders were selected and randomly divided into experimental (MBSR) and control groups. We should note that the two groups were matched for age, gender, and level of education as moderating variables. The study findings were analyzed using analysis of variance with repeated measures. All analyses were performed using the SPSS version 20) IBM Company, Armonk, NY, U.S.A).

The MBSR training interventions were implemented to the experimental group, in eight weakly 90-min sessions. Training sessions were delivered according to the fundamental concepts and specific techniques provided in the MBSR manual by Kabat-Zinn.^[17]

The content of MBSR training sessions are in sessions table as follows:

Sessions Details

First session	Understanding automatic pilot, "eating a raisin" meditation, practice the body scan meditation, choose a routine daily activity to practice mindfully
Second session	Dealing with barriers, continue to practice the body scan daily, choose another daily routine activity to do with mindfulness, practice being mindful of your breath for 10 min a day, complete a pleasant events diary
Third session	Being mindful in movement, mindful walking or stretching, practice the body scan, mini-meditation called the "3-min breathing space," complete an unpleasant events diary
Fourth session	Staying present, mindful movement: Stretching or walking, breathing space meditation, become aware of times of stress
Fifth session	Embracing acceptance, practice the guided sitting meditation, breathing space meditation, explore the difference in responding in a controlled way to more challenging situations
Sixth session	Realizing that thoughts are not facts, combine the sitting meditation, the body scan and mindful movement, breathing space, silent mindfulness meditation
Seventh session	Taking care of yourself, mindfulness meditation, breathing space, design a stress warning system
Eighth session	Reflection and change, mindfulness practice, how the 8 weeks of the course went for you, congratulate yourself for reaching this point

At the end of the training sessions, participants in both experimental and control groups were evaluated using the TAS and the Cognitive Emotion Regulation Questionnaire (CERQ) and after 3-month follow-up by those questionnaires [Figure 1].

Materials

The Test Anxiety Scale

This is a 37-item scale with a yes/no response format. It must be completed in 10–15 min. Higher scores on the TAS indicate higher test anxiety. Tryon (1980) reported

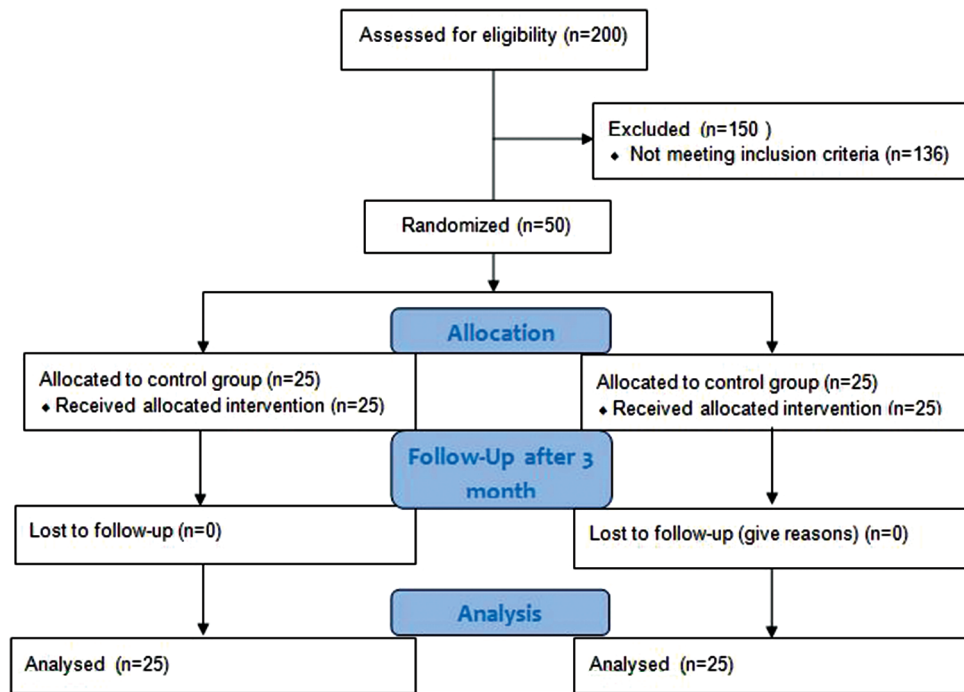


Figure 1: The study flow diagram

a test-retest reliability of 0.80 and a split-half reliability of 0.91 for the TAS.^[18] In Iran, Abolghasemi *et al.*, found a Cronbach's alpha of 0.81 for the TAS, reported significant correlations of the scale with the inhibitor ($r = 0.50$, $P < 0.001$) and facilitator subscales ($r = 0.67$, $P < 0.001$) and reported the criterion validity of the scale to be 0.72.^[19] In the present study, individuals with a score above 13 were selected as the study sample.

The Cognitive Emotion Regulation Questionnaire

This is a self-report questionnaire, developed by Garnefski, Kraaij, and Spinhoven (2001). The initial version of the questionnaire has 36 items assessing 9 cognitive coping strategies, including self-blame, blaming others, rumination/focus on thought, catastrophizing, putting into perspective, positive refocusing, positive reappraisal, acceptance, and refocus on planning. Every subscale of the CERQ has 4 items and is scored from 4 to 20. A principal components' factor analysis revealed nine factors. Test-retest reliability estimate indicated acceptable reliability of the cognitive coping strategies, and most of the subscales had acceptable internal consistency (Cronbach's alpha > 0.80).^[20]

In Iran, the Depression Anxiety Stress Scales were used to examine the convergent and divergent validity of the CERQ. Correlations between total score and subscales ranged from 0.40 to 0.68 (mean = 0.56), indicating acceptable validity of the questionnaire.^[21] In addition, 9 subscales had Cronbach's alphas ranging from 0.64 to 0.82, showing good reliability of the CERQ.^[22]

Results

After 3 months, data were collected and had been analyzed.

Table 1 shows demographic characteristics of participants.

As you can see in the second table the mean of the examination group has some changes through treatment and over the 3 month period after that; but it has no sensible changes in control group [Table 2].

And finally, Table 3 shows the results of analysis of variance with repeated measures on our collected data of this study.

As shown in Table 3, according to the assumptions of repeated-measures ANOVA, in every analysis that the Mauchly's test of sphericity was not significant; the Greenhouse-Geisser and Huynh-Feldt corrections were used based on sphericity (epsilon). The above table shows that the MBSR program has had continuous significant effects on test anxiety ($F = 70.74$, $P = 0.000$). It has also had significant effects on emotion regulation ($F = 70.74$, $P = 0.000$). This effect was not significant only for the self-blame subscale ($F = 2.335$, $P = 0.126$).

Discussion

The results of this study showed that treatment of MBSR on test anxiety and emotion regulation variables has been effective, except self-blame. As far as we know from a

Table 1: Demographic characteristics of the subjects participating

Property	Groups	
	Examination group, n (%)	Control group, n (%)
Grade		
First	9 (36)	9 (36)
Second	8 (32)	8 (32)
Third	8 (32)	8 (32)

review of previous studies, it seems that the present study is the first work examining the effect of MBSR on emotion regulation using a questionnaire related to this variable and assessing individuals with test anxiety symptoms in the follow-up. The study results indicated that the effects of MBSR lasted through the follow-up, for both of these variables, except for one of the subscales of emotion regulation.

The results of some other studies are also in line with the study results, with regard to the positive effects of MBSR on reducing anxiety and anxiety disorders in general. For example, van der Riet *et al.*, Frank *et al.*, Poulin, Zenner *et al.*, Bamber and Schneider, and McCloskey showed the effectiveness of mindfulness interventions on test anxiety of students.^[23-28] Vøllestad *et al.* also found that MBSR can be useful in keeping anxiety symptoms in a balanced level in people with anxiety disorders.^[29] In an examination of the outcomes of mindfulness, Tanay *et al.* found that teaching mindfulness skills can significantly decrease vulnerable mood and anxiety symptoms.^[30]

Dekeyser *et al.* showed that four components of mindfulness, i.e. observing, describing, action with awareness, and nonjudgmental acceptance are highly correlated to mindfulness skills and are related to better description and detection of body sensations and anxiety and less distress.^[31]

Consistent with the study results, Trent and *et al.* concluded that MBSR training can improve emotion regulation skills of students.^[32]

Regarding the supporting role of mindfulness in emotion regulation, Mitmansgruber *et al.* also found that in stressful conditions, patient's conscious awareness initially increases and then decreases.^[8]

Some other studies have also confirmed the positive effects of mindfulness on emotion regulation; however, we had not find any research inconsistent of our findings. Moreover, the most important difference between our study and previous research is that we used the related questionnaire (CERQ) in our study.

Finally, we can conclude that MBSR, due to its positive effects on developing a conscious and nonjudgmental

Table 2: The mean and standard deviation of test anxiety, emotional regulation and its subscales between experimental and control groups

Variable	Groups ($\bar{x} \pm SD$)	
	Examination group	Control group
Test anxiety		
Pretest	22.36±4.32	19.20±4.49
Posttest	12.08±5.15	20.24±5.48
Follow	14.88±3.55	20.20±4.07
Emotion regulation (total)		
Pretest	113.68±14.90	116.24±11.77
Posttest	123.44±13.06	115.96±13.58
Follow	122.08±13.43	115.32±14.15
Self-blame		
Pretest	13.44±2.12	13.88±2.80
Posttest	12.12±2.57	14.00±2.30
Follow	12.68±2.70	13.84±2.11
Other-blame		
Pretest	10.08±2.84	12.72±3.43
Posttest	15.08±2.56	12.64±2.73
Follow	1.76±1.16	2.28±0.73
Rumination		
Pretest	14.64±2.61	13.36±2.84
Posttest	10.96±2.80	13.60±3.09
Follow	10.96±2.80	13.60±3.09
Catastrophizing		
Pretest	11.52±3.17	13.56±3.38
Posttest	16.60±2.70	13.04±3.54
Follow	15.92±2.30	13.00±3.47
Putting into perspective		
Pretest	13.56±6.41	15.52±2.78
Posttest	17.24±2.38	15.12±3.43
Follow	16.64±2.34	14.96±3.28
Positive refocusing		
Pretest	11.16±2.82	14.24±2.87
Posttest	16.00±2.08	13.96±3.34
Follow	15.68±2.19	13.88±3.38
Positive reappraisal		
Pretest	10.92±3.32	12.84±2.89
Posttest	15.48±2.36	12.36±3.47
Follow	15.08±2.51	12.36±3.40
Acceptance		
Pretest	14.76±2.91	10.92±3.05
Posttest	10.32±2.76	11.80±4.08
Follow	10.68±2.85	11.80±4.06
Planning		
Pretest	13.60±3.40	9.20±3.35
Posttest	9.64±2.17	9.44±3.52
Follow	8.96±2.16	9.28±3.47

SD=Standard deviation

attitude, can significantly improve emotion regulation and thus, test anxiety. We can also say that the MBSR techniques have had continued and lifetime effects on students' lives, in such a way that these techniques have become a lifestyle for students. In fact, mindfulness, through a moment to moment, nonjudgmental, and step by step control of awareness, can improve patients'

Table 3: The results of analysis of variance with repeated measures

Variable	Test	Mean square	F	Significant	Partial η^2
Test anxiety	Sphericity assumed	433.580	70.74	0.000	0.596
Emotion regulation (total)	Huynh-Feldt	585.948	9.260	0.001	0.162
Self-blame	Huynh-Feldt	10.441	2.335	0.126	0.046
Other-blame	Sphericity assumed	81.380	17.910	0.000	0.272
Rumination	Huynh-Feldt	125.386	37.786	0.000	0.440
Catastrophizing	Huynh-Feldt	211.743	27.846	0.000	0.367
Putting into perspective	Huynh-Feldt	117.176	7.360	0.008	0.133
Positive refocusing	Huynh-Feldt	181.292	32.606	0.000	0.405
Positive reappraisal	Huynh-Feldt	166.868	33.085	0.000	0.408
Acceptance	Huynh-Feldt	188.979	31.349	0.000	0.395
Planning	Greenhouse-Geisser	152.775	26.212	0.000	0.353

self-control, self-regulation, and self-monitoring on their behaviors and guide them toward recovery. Hence, educational programs such as MBSR in school psychology improve the quality of life of students and ensuring their physical and psychological health at the pivotal age of adolescence. Different studies have shown that MBSR may not have a similar and permanent effect on different disorders; therefore, it is suggested that future studies examine the effectiveness of this method, on different disorders and in different clinical settings. It is also suggested that from time to time, it is needed to investigate how persistent are the effects of these therapies.

The present study had some limitations: a small population (Glopayegan city), a sample consisting only of female students, not having a placebo group, unavailability of objective instruments for data collection, and not comparing MBSR with other gold-standard therapies, such as cognitive-behavioral therapy. Therefore, future studies are suggested to replicate this study in larger populations and with samples consisting of both genders and compare MBSR with other common therapies. It is also suggested that future studies examine the effect of MBSR on other anxiety disorders.

Conclusions

One of the important issues regarding psychological interventions is to determine the effectiveness, durability, and applicability of these interventions in the life of patients. The study results indicated that the effects of MBSR lasted through the follow-up, for both of these variables. Using the results of this study may be proposed school counselors use mindfulness to reduce the anxiety of their pupils and thus improve their academic achievement.

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Conflicts of interest

There are no conflicts of interest.

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