

Materials and Methods

The present study is a quasi-experimental randomized design with pre-test-post-test design with control group. In this study, two groups (test and control) were evaluated in two stages (pre-test and post-test). The statistical population of this study included all women who referred to the headache clinic of Baqiyatallah Hospital in Tehran. Of them, 1396, who, according to the clinical diagnosis of a physician in accordance with the criteria of the International Association of Headache,¹ had been identified suffering with tension headache and migraine. In this research, the objective-based sampling was performed based on the inclusion and exclusion criteria. Inclusion criteria: 1. Diagnosis of tension headache and migraine by expert physician based on criteria of the International Association for Headache; 2. Age 18-50 years, 3. Least education degree of diploma, 4. Access to Internet and social network of Telegram. Exclusion Criteria: 1. Severe psychiatric disorders; 2. Addiction; 3. Regular meditation or yoga exercises; 5. Pregnancy and breastfeeding; 6. Starting a new medical treatment to prevent headaches within the next 45 days. Accordingly, 30 people were randomly assigned to the experimental and control groups using random numbers after being informed about the nature and objectives of the research, as well as taking an informed consent (each group included 15 people). For the control group, only the medical treatment as usual (MTAU) was performed. For the experimental group, in addition to the MTAU, the MBSR treatment was performed as bibliotherapy based on an 8-week treatment protocol. The protocol used in this study was designed using valid researches on

mindfulness and third generation behavioral therapy and self-help bibliotherapy.^{42,63-69} After writing the original text, the book was given to two psychologists with experience in the field of mindfulness, to be examined in terms of the adaptation of the text to the underlying assumptions of the mindfulness. A summary of the MBSR educational-therapeutic package is presented in Tables 1 and 2. During these 8 weeks, the experimental group participants were followed up weekly in a specific day and time by the support therapist and were questioned about their weekly exercise, and their ambiguities were clarified (30 minutes per week). Two weeks after the therapeutic-research period, the subjects of both groups were called out. The instruments used in research in the MBSR group were recompleted in this face to face meeting and received at the same meeting. Also in the control group, after completing the relevant questionnaires in the post-test, subjects who wanted to receive psychological treatment were treated with MBSR.

Results and Discussion

Table 3 shows the demographic data of participants, including age, marital status, and educational level. Data were analyzed using multivariate analysis of covariance test at inferential level. For this purpose, before analysis, the assumptions of covariance analysis were investigated using Levine's test, and the results showed that the distribution of data was normal, and variances were uniform. The mean and standard deviation of the headache intensity, distress, disability and mindfulness of the patients in the experimental and control groups are

Table 3. Demographic data of clients in the two groups MTAU and MBSR

Categorical Variable	MTAU Group (n =15)	MBSR Group (n =15)
Headache Diagnosis Frequency		
Chronic Tension-type (%)	6 (40)	4 (27)
Chronic Migraine (without aura) (%)	9 (60)	11 (73)
Marital status Frequency		
Single (%)	6 (40)	8 (53.3)
Married (%)	9 (60)	7 (46.6)
Employment		
Employed (%)	7 (46.6)	10 (66.6)
Unemployed (%)	8 (53.3)	5 (33.3)
Age (mean)	34.87 (9.12)	32.47 (9.11)

Table 4. Results of multivariate covariance analysis with mean and standard deviation for the experimental and control groups

Variable (Scoring Range)	Group	Pre-treatment	Post-treatment	MANCOVA		Effect Size
				F	P	
Pain Intensity (0-45)	MTAU	33.13 (7.61)	29.73 (6.30)	3.8	0.035	0.39
	MBSR	32.93 (6.67)	24.03 (11.21)			
Distress (0-42)	MTAU	31.67 (11.36)	20.6 (7.43)	18.21	<0.0001	0.59
	MBSR	30.27 (8.37)	17.13 (4.79)			
Disability (0-30)	MTAU	29.93 (10.95)	24.33 (8.09)	34.79	<0.0001	1.26
	MBSR	33.67 (12.40)	11.60 (5.32)			
Mindfulness (15-90)	MTAU	49.53 (7.03)	53.73 (7.78)	14.32	<0.0001	2.25
	MBSR	52.40 (6.42)	70.67 (5.56)			

presented in Table 4. The results of covariance analysis with the elimination of pre-test showed a significant difference between the mean scores of the experimental and control groups in pain intensity index ($P < 0.035$), distress ($P < 0.0001$), disability ($P < 0.0001$), and mindfulness ($P < 0.0001$) (Table 3). In addition, due to the special emphasis of the MBSR on the separation of the sensory dimension of pain from its emotional dimension,⁶⁹ the sub-scales have been reported separately (sensory dimensional pain and emotional lateral pain). According to the results, it can be concluded that the results of covariance analysis show a significant difference between the scores of the experimental and control groups in the emotional dimension of pain ($P < 0.0001$), although there was no significant difference in sensory dimension ($P < 0.44$).

This study was to investigate the effectiveness of mindfulness internet-based bibliotherapy on women with primary headaches (tension-type headache and migraine). According to the present study, pain intensity, distress, disability and mindfulness were all improved. As noted in the results, the overall pain intensity score improved. This finding is consistent with the findings of some studies on chronic pains,^{38,43,76-78} and headache,⁴⁷ but not consistent with the results of some other studies in this area.⁴⁸ Wells et al. investigated the effects of mindfulness on migraine patients, and the results of the pain intensity scale showed no reduction in the migraine headache intensity.⁴⁸ In another study, acceptance and commitment therapy was performed for Iranian women with migraine and tension headaches, and the severity of perceived headache did not decrease significantly.⁴² Also, in a meta-analysis that was conducted on the

effectiveness of MBSR in a variety of chronic pains (including primary headaches), the improvement in headache severity was lower than that of other pain types.⁵⁹ Regarding the association of some psychological characteristics with headache intensity,^{1,18,19,29} it can be argued that psychological mechanisms related to perceived pain intensity in primary headaches are different from that of other chronic pain types. Because mindfulness techniques make fundamental changes in subject's lifestyle,^{79,80} it is anticipated that in the long run, the intensity of pain decreases in the sensory dimension.⁸¹ Future studies can examine this difference. On the other hand, there was no significant difference between the two groups in the sensory dimension, despite the significant difference between the two groups in terms of total pain intensity. In contrast, in the affective dimension, a significant improvement was observed in the MBSR group compared to the MTAU group. Also, improvement of distress in MBSR group are additional findings of the present study. According to Reiner et al.,⁸⁰ with increasing mindfulness, one gets detached from negative emotions and thoughts related to pain and acceptance and willingness toward pain are increased, following which, the intensity of the perceived pain decreases. In other words, by increasing mindfulness and acceptance, distress derived from experiential avoidance and refusal of dirty pain is decreased.^{82,83} In this way, reducing the pain intensity score is due to reduced individual avoidance of pain and increased pain reception. This point indicates the importance of separation between the sensory and the affective dimensions, on which Kabat-Zinn, the founder of the MBSR, emphasized.⁶⁹ Therefore, it can be predicted that the reduction in pain intensity in

previous studies was due to the lack of separation between these two dimensions. Future research can examine this hypothesis.

In addition, the performance of the MBSR group was significantly improved compared to the MTAU. These findings are consistent with the assumptions of acceptance and mindfulness treatments. In general, the main purpose is to change the functioning of personal experiences (that is, the negative effects of negative thoughts and unpleasant feelings on behavior), not direct change of personal experiences (for example, changing the content or the frequency of thoughts).⁴³ In fact, the main focus of these treatments is on improving one's performance, despite some unpleasant experiences.^{38,43,76,84} According to Reiner et al., with increasing mindfulness, despite the existence of pain, efficient and self-regulated behaviors increase, thereby improving the performance and quality of life.⁸⁰

One of the important features of this research is its self-help feature. Although in the in-person treatment, the therapeutic communication is itself an effective ingredient in the treatment process,⁸⁵ in mindfulness-based therapies,⁸⁶⁻⁸⁸ some constraints such as cultural problems, fear of referral to the therapist,^{89,90} transportation problems, and high cost of treatment make people with headache unwilling to go to a therapist or to continue treatment. Although no quantitative comparison was made, a roughly akin comparison between the results of this study and other studies conducted on the subject area of mindfulness for people with headache showed a relatively similar effectiveness of the evaluated variables.^{42,48} Therefore, self-help treatments (such as bibliotherapy or treatment with educational packages or using the Internet), especially when people are not able to access in-person health care services for any reason, can be an appropriate and reliable treatment plan. Another important feature of this study is the lack of attrition of the subjects studied. Although it is anticipated that due to some proprietary features (including cost and time savings, nonexistence of transportation problems, and time flexibility of sessions), Internet-based and self-help interventions have fewer attritions,^{53-55,89} but the non-attrition of the subjects in the present paper cannot be attributed solely to these attributes. As Melville et al. have pointed out,⁹⁴ in some Internet-based methods, some non-specific features are also effective in reducing the attrition of subjects: 1. The average age of close to 33 years: The average age of the subjects in this study was 32.47 years; 2. Female gender: In this study, all subjects were females; 3. Unemployment in part-time work; 4. Experience with the Internet and online software tools: one of the inclusion criteria for the research. It is recommended that in future studies, while controlling non-specific variables, the effect of specific variables of self-help treatments on increasing the likelihood of adherence to treatment is investigated.

There were some limitations in this research. It was not possible to study the effects of treatment over long run.

Also, this study does not investigate the mechanism of the MBSR intervention effect. Another limitation was the use of a small population in the present study. The intervention was not measured in comparison with the active control group. In addition, in this study, sampling was performed only in one healthcare center, which reduces the generalizability of the results. In conclusion, we suggest that this protocol is followed up in future studies. Also, further research should examine the mechanism of the effects of this intervention. Considering the necessity of increasing the sample size in order to reduce the false positive findings,⁹⁵ it is suggested that future studies repeat the study with a larger sample size. Also, sampling from several health centers can be useful in increasing the generalizability of the results. Finally, we suggest that the study is compared with an active control group.³⁹

List of acronyms

DASS-21 - Depression, Anxiety, Stress Scale - Short Form

MIDAS - Migraine Disability Assessment Scale

MPQ-SF - McGill's Short Form Questionnaire

MAAS - Mindfulness Inventory

MBSR - Mindfulness-based stress reduction

MBSR-IBB - MBSR in Internet-based bibliotherapy

MTAU - Medical Treatment as Usual

Author's contributions

All authors contributed equally.

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Conflict of Interest

The authors report no conflicts of interests.

Ethical Publication Statement

We confirm that we have read the Journal's position on issues involved in ethical publication and affirm that this report is consistent with those guidelines.

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