

## The Effectiveness of Stress Reduction-Based Cognitive Therapy on Perceived Stress and Migraine Symptoms of Women Suffering from Migraine

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### ABSTRACT

**Background:** A headache is considered as one of the most common physical complaints and a type of debilitating neurodegenerative disorder that affects people's social, communicative and occupational tasks. Therefore, this study aimed to investigate the effectiveness of stress reduction-based cognitive therapy on perceived stress and migraine symptoms in women suffering from migraine. The instruments used in this study included the Perceived Stress Questionnaire and Migraine Disability Assessment Questionnaire. The present study data were analyzed using the covariance analysis.

**Methods:** The present study adopted a pretest-posttest with control group design. The statistical population of the present study included all patients suffering from migraine who went to the medical centers in Tehran in 2017. In this study, convenient sampling and random assignments were used. In fact, amongst the migraine patients, 30 patients were selected through a convenient sampling method that were then randomly assigned to experimental and control groups. The experimental group received an intervention in a three-month period in ten 90-minute sessions, whereas the control group did not receive this intervention during the research process. The patients were randomly assigned to the experimental and control groups.

**Results:** The results of data analysis showed that stress reduction-based cognitive therapy was effective on perceived stress and migraine symptoms in women suffering from migraine ( $P$ -value  $< 0.001$ ), that is to say, this treatment can reduce perceived stress and migraine symptoms in women suffering from migraine.

**Conclusion:** Based on the findings of this study, it can be concluded that cognitive therapy based on stress reduction can be used as an effective treatment to reduce stress and migraine symptoms in women with migraine. As the study findings revealed, it can be concluded that cognitive therapy based on stress reduction can be used as an effective treatment to reduce stress and migraine symptoms for women suffering from migraine.

**Keywords:** Cognitive Therapy, Migraine Symptoms, Stress



## Introduction

A headache can be regarded as a type of debilitating neurodegenerative disorder, which is one of the most common medical complaints.<sup>1</sup> A Migraine headache is a type of headache that is pulsating and repetitive which has symptoms of transient nerve. This headache appears in the temporomandibular region or the forehead which is accompanied by nausea, vomiting, and escaping from light and sound when exposed to its attacks.<sup>2</sup> Classical migraines (with aura and warning signs) and common migraines (without aura) involve different sorts of headaches.<sup>3, 4</sup> According to the Definition of International Association, migraine is often one-sided, pulsating and benignly recurring, with a duration of 4 to 72 hours, associated with excessive stimulation such as fear of light and sound, or gastrointestinal symptoms like nausea, and vomiting which can be aggravated through physical activities.<sup>5, 6</sup> Reduced effect of inhibitory mechanisms on pain transfer in the central nervous system, vascular expansion, and neurogenic inflammation seem to be the factors involved in migraine.<sup>7</sup> According to the statistics reported by the World Health Organization, for every one million people, there are 3,000 daily migraine attacks every day worldwide. According to statistics, 15 - 20% of patients to medical centers and 1 - 2% of the general population are afflicted with migraine,<sup>5</sup> of which women 18% had a higher share compared to men 7%.<sup>8</sup> The occurrence of periodical attacks of migraine has impaired the patient's activities, among which lack of concentration and the refusal to do any personal and social activities,<sup>9</sup> long-term absence from work and education, impact on mood and subsequently, the disturbance in the relationship of an individual with the surroundings can be mentioned.<sup>10</sup> Stress and tension can be stated as the predisposing factors in various physical disorders.<sup>11</sup> In addition, situations that have caused severe or prolonged stress in a person in which he/she is unable to adapt appropriately are amongst the risk factors in life. Research findings

indicated that the level and rate of stress placed on the individual were associated with a migraine.<sup>12</sup> In other words; stress is an unpleasant stimulus that can have a psychological or physical aspect.<sup>13</sup> It is assumed that stress is an inevitable part of life that everyone is engaged with, and from the perspective of mental health professionals, stress is an individual's general response to the demands and environmental pressures. On the other hand, it is associated with individuals' limited emotional resources to deal with these demands effectively.<sup>14</sup>

Since stress is one of the main causes of migraine, on the other hand, migraines can also exacerbate stress by altering the natural process of life and can mentally affect an individual.<sup>15, 16</sup> Based on some evidence, stress affects the physical system of the body in which it can cause many changes that ultimately lead to decreased health situations. Study findings indicated that a migraine has a direct relationship with stress and other psychological factors, and stress intensity can also produce a clear effect on the severity and duration of migraine.<sup>17</sup> Sauro et al. (2009) in a study on the interaction of stress and migraine, have demonstrated that stress can make these attacks be chronic in addition to being a common cause of chronic migraine attacks.<sup>18</sup> The results of some studies also confirmed that there was a significant difference regarding the perception of stress between patients suffering from migraine and healthy people.<sup>19, 20</sup> Various approaches have been used in the psychosomatic disorders treatment such as migraine among which cognitive therapy based on stress reduction can be mentioned. According to White,<sup>21</sup> when individuals are exposed to stress, they should have the necessary coping skills to reduce the stress effects. By mastering stress management and effective coping skills, individuals will be able to cope better with their lives' challenges and their needs. Cognitive reconstruction, conscientiousness, mental imaging, coping effectiveness training, self-assertiveness training,



and anger management are cognitive therapy techniques based on stress reduction.<sup>22, 23</sup> Findings of various studies suggested that cognitive therapy based on stress reduction was considered to be effective in reducing stress, anxiety and depression,<sup>22</sup> health anxiety,<sup>24</sup> symptoms of psychosomatic disorders,<sup>25</sup> behavioral trauma in patients with psychosomatic,<sup>26-28</sup> symptoms of physicalization and vertigo.<sup>29</sup>

Regarding the role of stress in exacerbating migraine<sup>15, 16, 18</sup> and the effectiveness of cognitive therapy based on stress reduction in decreasing the psychological damages, effective treatment in this regard is necessitated.<sup>22-29</sup> Since no study has been conducted with respect to the effectiveness of stress reduction-based cognitive therapy on perceived stress and migraine symptoms in women suffering from migraine, the present study aimed to investigate the effect of this treatment on perceived stress and migraine symptoms of women suffering from migraine. Therefore, the main issue to be evaluated in the present study was to investigate whether cognitive therapy based on stress reduction could affect perceived stress and migraine symptoms of women suffering from migraine.

### Methods

This experimental study used a pretest-posttest design with the control group. The statistical population included all women suffering from migraine who went to medical centers in Tehran in 2017. Convenient sampling method and random assignment were applied in order to select the sample size. Khatam-al-Anbia Hospital was selected amongst the medical centers in Tehran, using a non-random convenient sampling method. Next, 30 women with a history of migraine were selected amongst the clients referring to Khatam-al-Anbia hospital to participate in this study. In order to choose this sample size, the researchers referred to the scientific resources in the field of psychological intervention research. Delavar (2010) stated that in the experimental studies, the

adequate sample size for each group was 15 in order to generalize the findings. After declaring their readiness to participate in the research, the patients were randomly assigned to two groups of experimental and control group (15 in the experimental group and 15 in the control group). Then, before providing a cognitive therapy intervention based on stress reduction, questionnaires were attributed. The inclusion criteria involved diagnosing migraine disease by a neurologist, having no acute or chronic diseases other than migraine, having at least diploma degree, being satisfied with participation in the study, and obtaining unsatisfactory scores in Cohen's Perceived Stress Questionnaire.

Moreover, the exclusion criteria of the study included the history of using psychiatric medicine, synchronous psychological treatments, absenteeism more than two sessions, and failure to do their assignment. Subsequently, the experimental group received the cognitive therapy intervention based on stress reduction in ten 90-minute sessions within three months, whereas the control group lacked this intervention during the research process and continued their routine medicine therapy. It is worth noting that the experimental group, according to the physician's attitude, preceded the medicine therapy and therefore, the two study groups were homogenous in this regard.

In the present study, the following instruments were utilized:

#### Perceived Stress Scale

Cohen et al. (2006) devised the perceived stress scale in 2005, which contained 14 items, and each item was responded based on a five-point Likert scale (never, almost never, sometimes, often and most often). The coefficients of internal consistency reliability of the scale were obtained through the Cronbach's alpha coefficient ranging from 0.84 to 0.86 in two groups of students.<sup>30</sup> Perceived stress is significantly correlated with depression and physical signs of life events, social anxiety, and low life satisfaction as well as



the utilization of health services.<sup>17</sup> In a study conducted on Japanese students, the Cronbach alpha coefficient of the original scale and the Japanese edited scale were respectively reported 88.8 and 0.81.<sup>31</sup> In the present study, the Cronbach's alpha coefficient of the original scale was 0.86.

### **Migraine Disability Assessment Questionnaire:**

In 1999, Steward et al. designed the Migraine Disability Assessment Questionnaire. This questionnaire was normalized by Sajadi Nejad et al. (2009) and was carried out in the form of 22 questions through evaluating constructive validity analysis (factor analysis), simultaneous and congruent validity on patients suffering from headaches.<sup>32</sup> The patients were required to answer the questions as yes (4 scores), sometimes (2 scores) and no (zero scores). Emotional and functional disability factors caused by headaches are assessed by this scale. A higher score in this assessment indicates a higher degree of experienced disability.<sup>32</sup> Based on the calculations, the simultaneous validity of the correlation coefficients of the total score, emotional factor and functional factor with Scal-25 scale (Siptumpen, checklist 25) were obtained 0.71, 0.51 and 0.55 respectively. On the other hand, the convergence validity of the correlation coefficient of subscales with the total test was calculated 0.95 and 0.91. Also, split-half coefficient of reliability was 0.77 and the Cronbach's alpha coefficient for the whole test, emotional factor and functional factor were 0.86 and 0.84 respectively.<sup>32</sup> In this study, the reliability of the questionnaire was calculated 0.78 using Cronbach's alpha coefficient.

### **The Process of Research Implementation**

To conduct the present study, researchers visited the medical centers in Tehran from, which the study samples were selected and written consents were obtained. The participants were assigned into the experimental and control groups, and the questionnaires were given to the

participants in each group. In order to follow the ethics of the research, the subjects' consent form was obtained to participate in the intervention program, and the participants were informed of all stages of intervention. Furthermore, the control group was assured to receive these interventions upon completion of the research process. Both groups were also assured that their information would remain confidential and that there was no need to insert their name. Ultimately, the experimental group received a cognitive therapy intervention based on stress reduction according to Table 1, whereas the control group was trained in the same way as usual. The intervention program on cognitive therapy based on stress reduction was conducted in ten 90-minute sessions, a weekly session in groups of five during three months as follows.

In this study, two levels of descriptive and inferential statistics were used to analyze the study data.

Regarding descriptive statistics, mean and standard deviation were used. Regarding inferential statistics, Shapiro-Wilk test was used to examine the normal distribution of variables, Levine's test was applied for equality of variances, regression analysis was utilized to examine the homogeneity of the regression line slope, and covariance analysis was used to study the research hypothesis. Statistical analysis was performed using SPSS<sub>23</sub> software.

### **Results**

Findings related to demographic data demonstrated age range of 31 to 47 years old, mean age and standard deviation of  $37.41 \pm 3.45$  years for the study subjects. Most of them were also married 80%. Finally, the highest level of education in participants was the bachelor's degree 41%. Moreover, descriptive research findings are presented in Table 2.

The results of Table 2 indicated that the mean of perceived stress scores and migraine symptoms in the experimental group was reduced compared to the control group which could be related to



cognitive therapy based on stress reduction in the post-test. The significance of this change will be examined using the inferential statistics results. Before presenting the results of covariance test analysis, assumptions of parametric tests were assessed according to which Shapiro Wilk's test showed the normal distribution of sample data ( $P$ -value  $< 0.05$ ). The homogeneity of the variance was also estimated by Levine test in which the results were not significant demonstrating homogeneity of the variances ( $P$ -value  $< 0.05$ ). It should be also noted that in assessing the homogeneity assumption of the regression line slope, the results showed that the pre-test interaction with the grouping variable in the post-test stages was not significant in the variables of perceived stress and migraine symptoms; that is to say the homogeneity hypothesis of the regression line slope has been observed in variables of perceived stress and migraine symptoms. In addition,  $t$ -test results showed that the pre-test scores of experimental and control groups were not significantly different concerning dependent variables ( $P$ -value  $< 0.05$ ). The results of covariance analysis of the effect of group membership on perceived stress and migraine symptoms via controlling the pre-test variable are presented in Table 3.

As it can be observed in Table above, training stress-reduction-based cognitive therapy (independent variable) reduced the mean scores of perceived stress and migraine symptoms (dependent variables) in women suffering from

migraine in the post-test phase at 0.05 error levels. Therefore, it can be concluded that the mean scores of perceived stress and migraine symptoms in women suffering from migraine have been changed using cognitive therapy based on stress reduction. As a matter of fact, according to descriptive findings, post-test of perceived stress scores and migraine symptoms decreased in women suffering from migraine. The effect size of cognitive therapy training based on the stress reduction was 0.65 and 0.37 respectively on perceived stress and migraine symptoms in women suffering from migraine. In other words, 65% and 37% of changes in perceived stress and migraine symptoms in women suffering from migraine are explained by group membership (cognitive therapy based on the stress reduction).

Some limitations of the present study include the limited research scope in women suffering from migraine in Tehran, due to the lack of the necessary use of random sampling techniques, the lack of follow-up stages, existence of some uncontrolled variables, such as IQ status of women, financial status of families, the number of patients' children and their social status.

Therefore, in order to increase generalizability of the results, this study should be conducted in other regions and societies with different cultures, on other women, with the control of the mentioned factors and follow up using the random sampling method.

**Table 1.** Summary of cognitive therapy sessions based on stress reduction

Session 1	Program introduction, the concept of stress, the definition of stressors, influential factors, individual characteristics associated with stress management, stress responses, progressive muscle relaxation for 16 muscle groups
Session 2	Stress and awareness, evaluation process, 2 types of stress, physical and psychological consequences of stress, coping and its types, progressive muscle relaxation for 8 muscle groups
Session 3	Identification of stress symptoms, respiration, imaging, progressive muscle relaxation for 4 muscle groups
Session 4	Respiration and imaging (continued), passive progressive muscle relaxation, Negative thinking, and cognitive distortions, management strategies (overview)
Session 5	Relationship between thoughts and emotions, introduction to auto and insider thoughts, understanding cognitive distortions, identifying negative thoughts, cognitive restructuring, mental illustration, practical strategies for changing negative thoughts



Session 6	Further training on replacing rational thoughts, familiarity with the concept of coping, familiarity with coping types, familiarity with how to adapt coping styles to the situation, replacing rational thoughts (in 3 situations), self-taught learning, effective coping training
Session 7	Advanced self-training for heart rate, respiration, abdomen and forehead + self-training associated with illustration and self-induction / implementation of effective coping responses
Session 8	Familiarity with the definitions and benefits of social support, familiarity with various sources of social support, Mantra meditation, relaxation through reminders, developing awareness of anger and its various symptoms, and various forms of anger expression, identifying the causes of anger and strategies of anger management, relaxing via reminding.
Session 9	Familiarity with interpersonal communication styles, Types of expressive styles, Familiarity with barriers to expression, Meditation of breathing exercise Expression training
Session 10	Program review, doing post test

**Table 2.** Descriptive statistics of variables in the pre-test and post-test

Groups		Pre-test		Post-test	
		Mean	SD	Mean	SD
Experimental group	Perceived stress	51.06	6.98	43.20	6.23
	Migraine symptoms	61.13	5.97	49.66	5.28
Control group	Perceived stress	52.53	6.17	54.13	5.13
	Migraine symptoms	60.53	7.29	58.40	7.09

**Table 3.** Covariance Analysis of the Effect of Stress Reduction- based Cognitive Therapy on Perceived Stress and Migraine Symptoms

Variables	Statistical Indicators of Variables	Sum of Squares	Degrees of Freedom	Mean Squares	F	Significance Level	Effect Size	Test Power
Perceived stress	Pre-test	374.19	1	374.19	24.64	0.0001	0.43	0.99
	Group membership	758.05	1	758.05	49.92	0.0001	0.65	1
	Error	409.94	27	15.18				
Migraine symptoms	Pre-test	96.94	1	96.94	2.61	0.11	0.09	0.34
	Group membership	592.88	1	592.88	16	0.0001	0.37	0.97
	Error	999.99	27	37.03				

## Discussion

The current study was conducted to investigate the effectiveness of cognitive therapy based on the stress reduction on perceived stress and migraine symptoms in women suffering from migraine. The study findings revealed that stress reduction-based cognitive therapy was effective on perceived stress and migraine symptoms in women suffering from migraine ( $P$ -value  $< 0.001$ ).

The results of this study are in line with the findings of Luberto et al. (2017),<sup>24</sup> and Sizoo and Kuiper (2017).<sup>22</sup> Based on the findings of these

researchers, cognitive therapy based on stress reduction can reduce individuals' psychological stress by using cognitive restructuring techniques, restoration of cognitive distortion and change in negative self-thoughts and muscle relaxation. It can be stated that cognitive-behavioral interventions based on stress reduction rely on a positive performance in social communications and individuals' good self-esteem.<sup>33</sup> Indeed, it has created motivation and interest in people's lives as well as self-esteem in their family, occupational and social relationships.<sup>34</sup> In total, these factors



interact with each other and as a result, reduced the individuals' perceived stress.

It can be stated that through cognitive strategies for stress management, individuals can change their beliefs and cognitions regarding social and familial interactions as well as, disease effects and the stress associated with it.<sup>27</sup> On the other hand, via evaluating the prospects of the stressful state of affairs that an individual is faced with, individuals can change their irrational beliefs and cognitions in terms of the disease and social relationships and achieve more effective beliefs to cope with stress. As a matter of fact, individuals can deal more efficiently with the challenging situations of daily life via practicing different skills and applying behavioral strategies.<sup>3</sup>

Findings of the present study are consistent with the results of Schmid et al. (2011), Holmberg et al. (2007), Andersson et al. (2006), Johansson et al. (2001) and Asemi Zavareh et al. (2017), because these researchers mentioned that cognitive therapy based on stress reduction reduced the symptoms of psychosomatic disorders.<sup>25-29</sup> Regarding the findings interpretation, it can be stated that by identifying non-efficient thoughts, cognitive restructuring, and planning the activities through cognitive therapy based on stress reduction, one can obtain realistic information about human stress and its sources, the nature of stress responses and its various coping strategies. On the other hand, an individual can identify incompatible cognitions using these resources and cognitive evaluations, and reconstruct, adjust and correct them in order to be able to display more adaptive responses. In other words, it can be said that the treatment is done by creating a realistic assessment and appropriate cognition which can lead individuals to get rid of self-alienation and to regard value for them via identifying their beliefs and their cognitive distortions. It is worth noting that this process can increase the individual's sense of control.<sup>36</sup> Eventually, these factors will also reduce perceived stress and migraine.

Another point to note is that cognitive interventions based on stress reduction can lead to a decrease with respect to negative mood changes in individuals through presenting the training to increase self-control, adaptive coping, self-sufficiency and making changes. This process, in its turn, may also reduce the level of stress hormones and improve the functioning of immunity system.<sup>37</sup>

### Conclusion

The findings of the current study practically suggested that medical centers, in addition to physiological treatments, need to use the psychological method of cognitive behavior based on stress reduction to accelerate their treatment process, in order to improve the individuals who have suffered from migraine.

### Conflicts of Interest

In this study, was not reported any potential conflicts of interest with the authors.

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### Authors' Contribution

Conceptualization, A.A.N. and Z.Y.; Methodology, M.S.; Formal Analysis, M.S., Investigation, A.A.N.; Data Curation, Z.Y., Writing – Original Draft, Z.Y. and A.A.N.; Writing – Review and Editing, M.S Resources, Z.Y.; Supervision, M.S.

All authors read and approved the final manuscript and are responsible about any question related to article.

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