



Research Paper: Emotion Regulation Difficulties and Repetitive Negative Thinking in Patients With Tension Headaches and Migraine



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ABSTRACT

Background: Tension and migraine headaches are the most prevalent types of headaches. Some emotional and psychological factors are associated with these headaches.

Objectives: To elucidate the nature of individual differences in emotion regulation and repetitive negative thinking among patients with tension headaches and migraine and compare it with normal subjects.

Materials & Methods: In this cross-sectional, comparative study, the participants consisted of patients with tension headaches and migraine referring to the two neurology clinics in Isfahan City, Iran from 2019 to 2020. A diverse sample of patients (n=240) completed the difficulties in emotional regulation scale and perseverative thinking questionnaire. The Chi-square tests, Fisher's exact test, GLM (generalized linear model), Tukey post hoc test, and LSD (least significant difference) test were used to analyze the obtained data in SPSS V. 21.

Results: The results indicated that patients with a high level of repetitive negative thinking reported increased difficulties in emotional regulation and impulse control, limited access to emotion regulation strategies, and lack of emotional clarity (P<0.05). Moreover, the tension headaches group showed a higher level of difficulties in emotional regulation and repetitive negative thinking than the migraine and control groups (P<0.001).

Conclusion: Weak emotional regulation and repetitive negative thinking are associated with migraine and, especially tension headaches. Therefore, therapeutic plans based on emotion regulation and thinking problems should be considered as a complementary and necessary treatment for these types of headaches.

Keywords: Emotional regulation; Migraine disorders; Psychological distress; Tension-Type headache

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Highlights

- Difficulties in emotion regulation and repetitive negative thinking are more prevalent in patients with tension headaches and migraine than healthy people.
- Patients with tension headaches have more difficulties in emotion regulation than patients with migraine.
- Patients with tension headaches have more repetitive negative thinking than patients with migraine.

Introduction

Migraine and tension-type headaches as the most prevalent kinds of headaches with a spectrum of severity from mild to severe which can limit the daily activities and impair patient productivity [1]. Migraine is a recurrent and disabling headache with neurovascular pathophysiology is prevalent around the world, affecting about 1 billion people worldwide [2]. Migraine is more prevalent in women (20.7%) than men (9.7%) [3]. According to Yousefi et al., this disorder results from changes in the cerebral blood flow [4].

Tension-type headache is more prevalent than migraine [5]. As Burch suggested, this disorder is known as stress headache and can be periodic or daily. In periodic tension headache, the patients commonly experience pain, cramps, or a feeling of pressure around the forehead or back of the head and neck for 30 minutes to several days [4]. Pain, disability, and affective distress are the three main dimensions of headache. Among these interfering factors, emotional problems are the most important factor [6]. Based on neurobiological research, the neural processes connect pain and emotion and produce central nervous system pain sensitization. In support of this theory, several psychological research has documented the relationship between severe pain and emotional problems such as limited emotional awareness, expression, and emotional processing [7]. Although emotional problems are particularly important to understand experiences of pain in general, [8] it is not completely clear how emotion regulation styles can influence pain and disabilities due to pain [9]. Research suggests that both the sensory (intensity) and the affective (unpleasantness) components of pain are influenced by emotion regulation processes. Pain is a sensory and emotional experience, consisting of affective-motivational, cognitive-evaluative, and sensory-discriminative dimensions [10].

Emotion Regulation (ER) is the ability to modulate emotional experience and expression [11]. ER can change the capacity, severity, and time course of responses to the ac-

tivated emotion and also affects physiological responses [12]. Successful emotion regulation as an essential component of human health and wellbeing has several dimensions, such as awareness, acceptance of emotions, modulation of emotional arousal, and the ability to act in desired ways regardless of emotional state regulation [13, 14]. Maladaptive emotion regulation not only affects the range of emotional processing but also interferes with the biological and psychological flexibility [10].

On the other hand, emotional regulation is an important transdiagnostic emotional factor associated with repetitive negative thoughts and includes strategies used by people in a wide range of emotions [15]. Repetitive negative thoughts are particular cognitive vulnerability factors related to the etiology and maintenance of emotional problems [16]. According to the emotional regulation model, people with emotional problems experience a lot of negative emotions due to emotional irregularity when faced with stress, and thus turn to rumination and repetitive negative thinking to remove these unpleasant feelings [17].

Repetitive Negative Thinking (RNT) is a style of thinking about negative experiences or problems with three main features: repetition of thoughts, intrusive thoughts, and difficulty in forgetting them. Two major forms of RNT are rumination and worry that are related to several different emotional problems [18, 19]. Worry is an uncontrollable cycle of thoughts about the negative events that may occur in the future, and rumination is the propensity to repeatedly think about emotions and problems [16]. The current study aimed to examine the associations between difficulties in emotion regulation and tension and migraine headaches by investigating the mediation role of RNT.

Materials and Methods

Design and population

The study population was patients with tension headaches and migraine referring to the neurology clinics of Askarieh Hospital and Samen Medical Center in Isfa-

han City, Iran, from 2019 to 2020. The present study is cross-sectional comparative research. Difficulties in emotion regulation and RNT as independent variables were measured by Difficulties in Emotional Regulation Scale (DERS) and Perseverative Thinking Questionnaires (PTQ). The dependent variables of the study, i.e. migraine and tension headache disorders, were identified based on International Headache Society (IHS) criteria [20].

Samples were chosen by convenience sampling method. To increase the accuracy of the study, patients with other diagnoses than migraine or tension headaches were excluded from the study, and patients with only migraine or tension headache after definitive diagnosis completed the study questionnaires. After the sample groups (patients with migraine and tension headache) reached the required number, the collection of samples stopped. Then healthy participants were selected. They have not visited a doctor with a complaint of any serious headache and have not received a diagnosis of any kind of headache disorder or other neurological and psychiatric disorders. Both migraine and tension headache groups had the first headache attack at least 1 year before being included in our study. Then with their consent, they completed the study questionnaires. The sample size was determined based on Krejcie and Morgan's table [21] for each group of patients. The study participants were 240 people divided into three groups (tension headache, migraine headache, and normal groups). The exclusion criteria were having other coexisting primary or secondary headache or combined headache according to the IHS criteria; serious systematic disease (i.e. hepatic, cardiac, or renal) or neurologic disorder; or inability or unwillingness to cooperate.

Research questionnaires

Difficulties in Emotion Regulation Scale (DERS)

This scale includes six subscales with 36 items: non-acceptance of emotions (6 items; $\alpha=0.85$), difficulties engaging in goal-directed behavior when distressed (5 items; $\alpha=0.89$), impulse control difficulties (6 items; $\alpha=0.86$), lack of emotional awareness (6 items; $\alpha=0.80$), limited access to emotion regulation strategies (8 items; $\alpha=0.88$); and lack of emotional clarity (5 items; $\alpha=0.84$), $\alpha = 0.93$ for the total scale. The participants rate each item on a scale from 1 (almost never, 0%–10%) to 5 (almost always, 91%–100%). Earlier research has shown good psychometric properties for the scale (Gratz & Roemer, 2004). The internal consistency of the measure in the present study was 0.91 [22].

Perseverative Thinking Questionnaire (PTQ)

PTQ is a content-independent measure of trait RNT and includes three subscales with 15 items. The participants rate each item on a scale from 0 (never) to 4 (almost always) and decide how often each of the items applies to their process of thinking. Results of factor analyses support a hierarchical model with one higher-order factor of RNT. Three lower-order factors present as the core characteristics of RNT ($\alpha = 0.94$), perceived unproductiveness of RNT ($\alpha = 0.83$), and RNT capturing mental capacity ($\alpha = 0.86$), with $\alpha = 0.95$ for the total scale. Preliminary research has shown good psychometric properties for the measure. The internal consistency of the measure in the present study was 0.95 [22, 23].

Statistical methods

In this study, Mean \pm SD were used to describe continuous data and frequency (%) for categorical data.

In the inferential part, the Chi-square tests, Fisher's exact test, Analysis of Variance (ANOVA), Tukey post hoc test and LSD (least significant difference) tests, and GLM (generalized linear model) were used. All analyzes were performed in SPSS V. 21 at the significance level of 0.05.

Results

Table 1 compares the distribution of gender, education, and age of the participant in the whole study sample and separately in three groups of normal, migraines, and tension headaches.

As shown in Table 1, the sample group consisted of 66.7% female (n=160) and 33.3% male (n=80) participants. Also, 17.1% (n=41) had less education than diploma, 53.3% (n=128) diploma, 25% (n=60) Bachelor's degree, and 4.6% (n=11) Master's degree. The Mean \pm SD age of the participants was 36.77 \pm 10.58 (range: 18-50) years. Results of the Chi-square test did not show a significant difference between the three groups ($P>0.05$) regarding gender and age. However, the distribution of educational status in the three groups of participants was significantly different ($P<0.05$) (Table 1).

We used block randomized design as one of the GLM models and considered education as a block to adjust its effect. Before running the model, we checked the model assumptions. Based on the Kolmogorov-Smirnov test result, residuals in the block and group had a normal distribution. Moreover, Levene's test results should that homogeneity of

Table 1. Comparison of demographic characteristics of the participants in three groups (migraine, tension headache, and healthy)

Variable		No.(%)				P
		Group				
		Migraine Headache (n=80)	Tension Headache (n=80)	Healthy (n=80)	Total (n=240)	
Gender	Female	52 (65.8)	55 (68.8)	53 (65.4)	160 (66.7)	0.888*
	Male	27 (34.2)	25 (31.3)	28 (34.6)	80 (33.3)	
Education	Less than diploma	23 (29.1)	15 (18.8)	3 (3.7)	41 (17.1)	0.002**
	Diploma	35 (44.3)	43 (53.8)	50 (61.7)	128 (53.3)	
	Bachelor's degree	16 (20.3)	19 (23.8)	25 (30.9)	60 (25.0)	
	Master's degree	5 (6.3)	3 (3.8)	3 (3.7)	11 (4.6)	
Age(y) (Mean±SD)		37.56±11.86	37.89±10.85	34.90±8.70	36.77±10.58	0.146***

* Done by the Chi-square test;



** P-values of the Chi-square and Fisher exact test were the same;

***Done by ANOVA test.

Table 2. Comparison of the total score of the difficulties in emotional regulation and repetitive negative thinking

Variable	Mean±SD				P Group***	P Educa- tion†
	Group					
	Migraine (n=80)	Tension Headache (n=80)	Healthy (n=80)	Total (n=240)		
Total score of difficulties in emotional regulation	92.94±17.60	124.00±16.25	76.09±14.66	97.60±25.64	<0.001	0.064
Non-acceptance of emotional responses	13.55±5.07	20.92±7.59	9.80±5.45	14.74±7.47	<0.001	0.073
Difficulties engaging in goal-directed behavior	14.29±3.27	18.95±4.23	12.25±3.77	15.15±4.70	<0.001	0.010
Impulse control difficulties	14.98±9.66	19.50±5.21	12.79±4.49	15.75±5.63	<0.001	0.280
Lack of emotional awareness	17.37±5.14	21.43±4.80	16.86±5.57	18.55±5.55	<0.001	0.863
Limited access to emotion regulation strategies	50.15±6.83	26.85±6.93	13.95±5.94	20.29±8.42	<0.001	0.731
Lack of emotional clarity	13.82±5.86	15.92±4.53	10.70±3.24	13.47±5.10	<0.001	0.861
Total score of RNT	32.03±10.61	38.05±9.02	13.78±3.75	27.88±13.27	<0.001	0.549
The core characteristics of RNT	18.72±6.77	22.20±5.74	7.75±2.19	16.17±8.11	<0.001	0.706
Perceived unproductiveness of RNT	6.22±2.28	7.51±2.20	2.51±1.10	5.40±2.87	<0.001	0.862
RNT capturing mental capacity	7.32±2.73	8.26±2.42	3.48±1.35	6.34±3.05	<0.001	0.482

***Done by GLM models;



†The level of education was considered a block.

variances in group and education is assumed. The results of GLM models (Table 2) showed that the mean of difficulties in emotional regulation total score and all its subscales (non-acceptance of emotional responses, difficulties engaging in goal-directed behavior, impulse control difficulties, lack of emotional awareness, limited access to emotion regulation strategies and lack of emotional clarity) had significant differences between the three groups ($P<0.001$)

(Table 2). Also, the results of the Tukey post hoc test and LSD test showed difficulties in emotional regulation in the tension headache group (124.00 ± 16.25) was significantly higher than migraine (92.94 ± 17.60) and normal groups (76.09 ± 14.66) ($P<0.001$) (Table 2).

Moreover, the results showed that repetitive negative thinking total score and all its subscales (the core character-

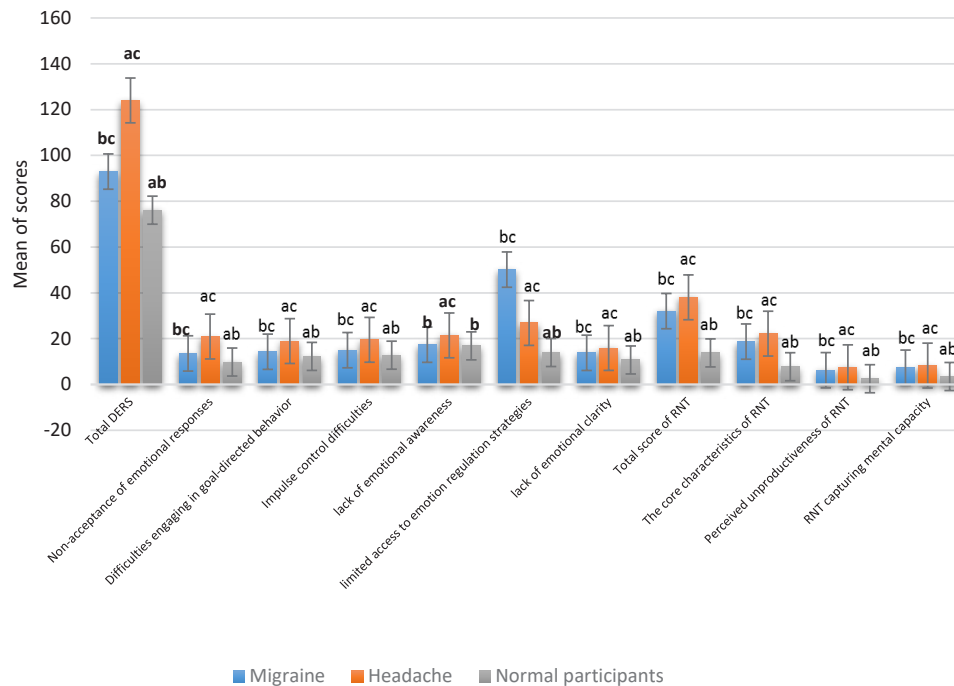


Figure 1. The results of post hoc tests to compare difficulties in emotion regulation scale, repetitive negative thinking, and their subscales among three groups

A: Shows the significant difference compared to migraine group; B: Shows the significant difference compared to the tension headache group; and C: Shows the significant difference compared to the normal participants; The significance level was 0.05 for all comparisons; Bars show Mean±SD.

istics of RNT (repetitiveness, intrusiveness, difficulties with disengagement), perceived unproductiveness of RNT, and RNT capturing mental capacity had significant differences between the three groups. Tukey post hoc test and LSD test showed that RNT total score and all its subscales in the tension headaches group was significantly higher than that in the migraine and healthy groups ($P < 0.001$). Furthermore, RNT total score and all its subscales in the migraine group were significantly higher than those in the normal group ($P < 0.001$) (Table 2, Figure 1).

Discussion

The current study assessed the relationship between difficulties in emotion regulation and tension and migraine headaches with the mediation of repetitive negative thinking. This study covered migraine and tension headache patients referring to neurology clinics in Isfahan City, Iran. According to the statistical results, the difficulty of emotion regulation in the headache group (tension headache and migraine) was higher than that in the control group.

Bussone et al. elaborated the IASP definition of pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.” Clinicians working on headaches emphasize that emotional stimulate can trigger a migraine or a cluster period. Such experiences suggest that cortical and subcortical circuits not only are responsible for emotion regulation but also play a significant role in pain regulation [24, 25]. Various research studies have shown that somatization of emotions in a wide range of patients with recurrent headache is a common feature of their problems [26].

Emotional regulation in pain

Reynolds et al. found that negative thinking and emotion sensitivity are associated with pain severity and interfering pain with daily activities [14]. Lutz et al. highlighted the relationship between emotion regulation and chronic pain [27]. Baker et al. found that chronic pain was associated with an abnormality in emotional control and working memory, which might be susceptible to the detrimental effects of chronic pain [28]. Ruiz-Aranda et al. analyzed the influence of emotional regulation in

acute pain utilizing the CPT (cold pressor test). They revealed that women who have higher emotional repair deal with the CPT better and can reduce its emotional impact, and experience it as less painful [29].

Emotional regulation in headache

Based on Perozzo et al. research, those who suffer from chronic headaches are weak in controlling angry feelings and trait anger. Also, anxiety, depression, obsessive-compulsive symptoms, phobias, and psychophysiological disorders are more frequent in these patients [30]. According to Just et al. study, emotional and behavioral problems of clinical relevance in headache sufferers are 3 times more frequent than that in headache-free controls [31]. Yucel et al. and Basedon's finding suggested that a person with a tension-type headache has high automatic thoughts, depression scores, and may have difficulty with the expression of their emotions. Headache frequency appears to influence the likelihood of coexisting depression [32], and specifically, headache sufferers have difficulty in regulating anger. Materazzo et al. [33] according to another study by Wise et al. found that alexithymia, or problems identifying and feeling emotions, was strongly associated with recurrent headaches [34].

Migraine patients with lower difficulties in emotion regulation

Recent study findings also show that patients with tension headaches compare to migraine patients have higher scores on the difficulty of emotion regulation. Some studies report that migraine patients are self-composed in their emotional expression and personality qualifications and also behave in a way that makes others respect them and know them pleasant and agreeable [35]. Furthermore, Perozzo et al. suggested that migraine patients do not have plenty of negative emotions such as anger and or suppressed anger, but tension-type headache patients are more openly hostile and consciously troubled [30]. These findings show why migraine patients have a lower level of difficulties in emotion regulation compared with tension headache patients in a recent study.

RNT and emotional dysfunction

On the other hand, Broeren et al. demonstrated positive correlations between measures of general vulnerability, repetitive negative thoughts, and emotional problems [16]. Ehrling and Watkins in a review article have pointed some evidence for elevated levels of repetitive negative thinking in as much as 13 different disorders, including depression, post-traumatic stress disorder, obsessive-

compulsive disorder, insomnia, eating disorders, pain disorder, hypochondriasis, alcohol use disorder, psychosis and bipolar disorder [36]. Mahoney et al. mentioned that the RNT is significantly associated with negative emotions, including anxiety, depression, shame, anger, general distress, as well as neuroticism [37].

Based on Gil et al. finding, negative thoughts are significantly related to the pain experience, and patients with more frequent negative self-statements and negative social cognition have more severe pain [38]. And Denovan et al. analysis revealed the relationship between neuroticism and somatic complaints [39]. Repetitive negative thinking is a maladaptive reaction to negative emotions and a transdiagnostic risk factor that is commonly characterized by recurrent and uncontrollable thoughts that result in distorted and negative inference about the present, past, and future events and also psychological and emotional symptoms in the present situation [40]. Moreover, Arditte et al. finding suggested that repetitive negative thinking is a transdiagnostic phenomenon that is present across affective disorders [41].

RNT as a mediating factor

Our study found that repetitive negative thinking can play a mediating role between difficulty in emotional regulation and tension headache and migraine. Fortunately, the statistical results support this hypothesis. The results showed a positive correlation between the total score of difficulty in emotional regulation and repetitive negative thinking score, also tension headaches patients with emotional regulation scores above the migraine group have similarly higher scores on repetitive negative thinking than the migraine group. Data analysis also showed a direct and significant relation between repetitive negative thinking and subscales of difficulty in emotional regulation consisting of, impulse control difficulties, limited access to emotion regulation strategies, and lack of emotional clarity.

Also, no relationship was observed between repetitive negative thinking and non-acceptance of emotional responses, difficulties engaging in goal-directed behavior and lack of emotional awareness in headache groups compared with the control group. In this way, Bahadori Khosroshhi et al. showed a significant positive relationship between repetitive negative thinking with the components of non-acceptance of emotional responses, difficulties engaging in goal-directed behavior, impulse control difficulties, lack of emotional awareness, lack of emotional clarity, and total score difficulties in emotional regulation [17].

Study Strengths and limitations

The strengths of the study included the appropriate participation rate and the use of validated headache diagnosis. There was no systematic selection of the interview participants and it guarantees that the study cohort represented the study population fairly well and also this study provided the first structural model to elucidate the mediating role of repetitive negative thinking in tension headache and migraine patients. A considerable limitation concerns the exclusive use of self-reports. So, it would also be interesting to assess the links between difficulties in emotion regulation and repetitive negative thinking and headache by objective measures.

Conclusion

In conclusion, this study highlights the importance of emotion regulation in headache, and also it has revealed the mediating role of repetitive negative thinking. We also suggest that an interdisciplinary attitude to the headache research may be useful for the better therapeutic management of patients. Emotional and cognitive focused interviewing can help a physician to determine whether emotional and cognitive processes are relevant in individual patients. These results recommend that future research focus on prevention and intervention programs strategies to promote adaptive emotion regulation skills and reduction in repetitive negative thinking may reduce both tension headache and migraine disorders. Finally, our results highlight effective emotional regulation and specific attention to the negative thinking in tension headache and migraine. These results may contribute to the understanding of these headache disorders. Further studies should be conducted to confirm and expand upon our findings.

Ethical Considerations

Compliance with ethical guidelines

The study was approved by the Ethics Committee of the Mashhad University of Medical Science (34255). All study procedures were in compliance with the ethical guidelines of the Declaration of Helsinki, 2013.

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Authors contributions

Drafting the original paper: Azaheh Haratian; Writing, reviewing, and editing the paper: Azadeh Haratian, Soroor Kiani and Kavian Ghandehari; Provision of study patients: Mohammadmehdi Amjadi; Collecting resources: Azadeh Haratian and Soroor Kiani, Zohreh Aghababaei; Supervising the research: Kavian Ghandehari, Hamidreza Hatamian, and Azadeh Haratian; Data collecting: Azadeh Haratian, Soroor Kiani, Mohammad Mahdi Amjadi, Zohreh Aghababaei; Analysis and interpretation of data: Maedeh Habibi, Marjan Ataei.

Conflict of interest

The authors declared no conflict of interest.

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