

Comparison of Pain-Related and Psychological Variables between Acute and Chronic Migraine Patients, and Factors Affecting Headache Chronicity

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ABSTRACT

Background: Migraine headache is classified as acute or chronic. In recent years, efforts have been made to identify the factors that might predispose individuals to develop the chronic-type headache. The present study aimed to draw a comparison between patients with acute and chronic migraine in terms of demographic, pain-related, and psychological variables. In addition, we also investigated factors affecting headache chronicity in such patients.

Methods: The present cross-sectional study was conducted during 2017-2018. The target sample consisted of 250 patients with acute or chronic migraine who referred to various clinics affiliated to Shiraz University of Medical Sciences (SUMS), Shiraz, Iran, recruited by convenience sampling. All the participants filled in the questionnaires related to demographic characteristics, pain intensity, disability, depression, emotional intelligence, and anger. The data were analyzed using SPSS software (version 22.0) with *t* test, Chi-square test, and logistic regression analysis. $P < 0.05$ was considered statistically significant.

Results: Patients suffering from chronic migraine experienced higher levels of disability, depression, anger, and had lower levels of emotional intelligence compared to those with acute migraine. Based on the logistic regression analysis, variables that had a significant effect on headache chronicity were female gender (OR=5.81), married status (OR=3.77), patients with lower level of education (OR=0.26), headache duration (OR=1.53), disability (OR=0.28), depression (OR=3.66), and anger (OR=5.04).

Conclusion: Variables such as disability, depression, and lack of anger control were among the key factors associated with headache chronicity in migraine patients.

KEYWORDS: Anger, Chronicity, Disability, Emotional intelligence, Migraine

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INTRODUCTION

Pain is one of the major global health problems. It is defined as ‘a distressing experience associated with actual or potential tissue damage with sensory, emotional, cognitive, and social components’. Pain is classified as acute or chronic. However, the latter could have a dramatic impact on patients’ lives as well as posing a financial burden on society.^{1,2} The negative impact of chronic pain leads to a lower quality of life and such patients are more at risk of suicidal tendencies.²⁻⁴ Psychological disorders (e.g., depression) are more common in patients with chronic pain compared to healthy individuals.^{5,6}

Migraine headache is a common type of pain that often affects one or both sides of the head. The main symptoms are nausea, vomiting, photophobia, and phonophobia which are exacerbated by physical activity.^{7,8} Acute migraine has a sudden onset and an attack lasts <15 headache days per month over 1 year, while chronic migraine lasts for ≥15 headache days per month for three consecutive months.⁹ Transformation of acute headache into the chronic type occurs gradually and the process is called headache chronicity.¹⁰

Chronic migraine affects physical, psychosocial, and financial aspects of the patient’s life. Patients with migraine are unable to carry out daily activities such as household chores, study activities, attendance and punctuality at work, nor can they enjoy leisure time. These factors negatively affect the quality of life and cause tension. Consequently, such patients become susceptible to mental illnesses such as depression.¹¹⁻¹³ The comorbidity of migraine and depression leads to reduced mental health, and social and physical function; it also increases the level of pain, anxiety, and the financial burden.^{5,14} The pain intensity in patients with chronic migraine is 2- to 3-fold higher than in patients with acute migraine,¹⁵ which in turn increases the frequency and intensity of the headaches. In recent years, efforts have been made to identify those

factors predisposing individuals to develop the chronic-type migraine. However, it is still not fully known which variables play a role in the transition from acute to chronic pain.

A previous study reported that headache chronicity negatively affects the quality of life.¹⁶ Other studies have assessed the risk factors associated with the transition to chronic migraine which included obesity, snoring, stressful life events, baseline high attack frequency, and overuse of certain classes of medication such as opiate and barbiturate combinations.¹⁷ In addition, depression and anxiety have also been associated with an increased risk of new-onset chronic migraine.¹⁸ While the majority of the studies were aimed at predicting the onset of chronic migraine headache, to the best of our knowledge, variables affecting headache chronicity (e.g., pain intensity, emotional intelligence, anger) have not been examined. Therefore, the present study aimed to draw a comparison between patients with acute and chronic migraine in terms of pain-related variables (pain intensity, duration of headaches), psychological variables (disability, depression, emotional intelligence, anger), and demographic characteristics. In addition, we also investigated factors affecting headache chronicity in such patients.

MATERIALS AND METHODS

The present cross-sectional study was conducted during 2017-2018. The target population consisted of patients with acute or chronic migraine who referred to various clinics affiliated to Shiraz University of Medical Sciences (SUMS), Shiraz, Iran. In accordance with criteria set by the International Headache Society (IHS) and a similar study,¹⁹ the sample size was determined using NCSS software based on the below formula.

$$N = [(Z\alpha + Z\beta) / C]^2 + 3$$

$$\alpha = 0.05, \beta = 0.2, r = 0.19, \text{ and } C = 0.5 \times \ln[(1+r)/(1-r)]$$

The determined sample size was 215 participants. However, assuming a 15% loss to follow-up, we decided to recruit 250 patients.

The inclusion criteria were age 18-60 years, an official diagnosis of acute or chronic migraine by a neurologist based on the IHS criteria,⁷ the ability to read-write/understand-respond, and willingness to participate. The exclusion criteria were known psychiatric disorders (schizophrenia, intellectual disability, etc.) which might interfere with the process of the interview, medical records of secondary headaches (brain tumor), chronic pain (backache), and chronic diseases (diabetes, multiple sclerosis). Accordingly, 170 patients with chronic migraine and 80 with acute migraine were recruited by convenient sampling.

The data collection tools consisted of a demographic data sheet, the numeric rating scale (NRS), migraine disability assessment questionnaire (MIDAS), patient health questionnaire (PHQ-9), Bradberry-Greaves' emotional intelligence questionnaire (EI), and Novaco anger scale (NAS). All the participants filled in the questionnaires individually and in separate rooms in various clinics. Demographic characteristics included age, sex, marital status, education level, and occupation.

The original version of the NRS was first developed by Oucher in 1992.^{20,21} The NRS is a non-specific measurement scale consisting of 11 numbers from 0-10, where 0 means no pain at all and 10 is the worst imaginable pain. The patients were requested to select a number that best describes the intensity of pain experienced during the preceding 2 weeks. The construct validity of the Persian version of the NRS was confirmed by Vakil Zadeh using both the exploratory and confirmatory factor analysis methods. The reliability of the scale was confirmed by Cronbach's alpha with coefficients ranging from 0.87 to 0.89. The questionnaire was reported as a valid and reliable instrument for pain assessment in patients with chronic pain.²²

Migraine Disability Assessment

The 7-item MIDAS questionnaire was developed by Stewart and Lipton in 1999

to evaluate the degree of migraine-related functional disability over the preceding 3 months.²³ Of the seven items of this scale, the first five items determine the number of missed days of school/work, household, and of non-work related activities due to migraine headaches, over the last three months. Items 1 and 2 assess limitation in school or workplace activities, items 3 and 4 deal with limitations in household activities, and item 5 with limitation in social or leisure time activities with family members. The last two questions of this questionnaire measure the frequency of the headaches and assess the pain intensity on an 11-point scale. The sum of the scores from this questionnaire indicates one of the four disability grades: low, mild, moderate, and severe. The scores 0-5 indicate low disability, 6-10 mild disability, 11-20 moderate disability, and scores ≥ 21 indicate severe disability. As to the reliability and validity of this questionnaire, Ertas and colleagues indicated good test-retest reliability ($r=0.68$). The internal consistency of MIDAS was assessed using Cronbach's α and reported to be at an acceptable level (>0.7). The validity was assessed using correlations between the total MIDAS scores and the number of headache days during the last month in visit 1 ($r=0.60$, $P<0.001$), visit 2 ($r=0.47$, $P<0.001$) and visit 3 ($r=0.63$, $P<0.001$) as an indicator of disability due to migraine (Spearman correlation coefficients: $r=0.60$, 0.47 ; and 0.63 , respectively, $P<0.001$).²⁴

In Iran, Zandifar and colleagues confirmed the reliability of MIDAS in migraine patients with internal consistency (Cronbach's alpha ranging between 0.7-0.8) and test-retest. The test-retest reliability for all the questions was between 0.54 and 0.71. The construct validity of the Persian version of MIDAS was assessed by correlating its total score with the SF-36 Mental ($r=-0.41$) and Physical scores ($r=-0.36$) and the Pain Catastrophizing Scale ($r=-0.36$) in a sample of patients with migraine and tension-type headaches.²⁵

PHQ-9 is one of the most appropriate screening tools for depression in patients with chronic diseases. It has 9 items and takes less

than 10 minutes to answer. All items assess the symptoms over the prior two weeks. Each item is scored between 0 and 3 points, and the total score ranges from 0 to 27. Scores from 0 to 4 indicate minimal depression, 5 to 9 mild depression, 10 to 14 moderate, 15 to 19 fairly severe, and ≥ 20 indicates highly severe depression.²⁶ Lotrakul and colleagues confirmed that the PHQ-9 had a satisfactory internal consistency (Cronbach's alpha coefficient=0.79) and showed moderate convergent validity. The categorical algorithm of the PHQ-9 had low sensitivity (0.53), but very high specificity (0.98) and positive likelihood ratio (27.37).²⁷ In a study by Khamseh and colleagues, the reliability (Cronbach's alpha coefficient=0.87) and validity of the Persian version of the instrument were confirmed. The Persian version also showed a high sensitivity (73.8%) and specificity (76.2%) regarding the diagnosis of a depressive disorder. They reported a strong internal consistency (Cronbach's alpha coefficient=0.89) of the questionnaire.²⁸

EI was developed by Bradberry and Graves in 2004. The questionnaire contains 28 items grouped into 5 domains, including general emotional intelligence and self-awareness (items 1-15), self-regulation (items 16-19), social awareness (items 20-27), and management of relationships (item 28). Scoring is based on a 6-point scale from 1 to 6 and the total score ranges from 28 to 168. The scores >80 indicate a high level of emotional intelligence and those <60 show poor emotional intelligence.²⁹ In a study by Stys and colleagues, the reliability was confirmed with internal consistency, Cronbach's alpha coefficient ranging from 0.86 to 0.99. The content validity was determined by experts who evaluated the items related to each of the subscales.³⁰ Ganji and colleagues confirmed its reliability with a Cronbach's alpha of 0.88. Convergent validity was used to determine its validity. To this end, the test was performed together with the Bar-On model of emotional intelligence test in a 97-seat group. The correlation coefficient

was estimated at 0.99. The results showed that this questionnaire had acceptable validity and reliability in Iran.³¹

The 25-item NAS was developed by Novaco in 1986 to measure anger, aggression, and malice. The components of this questionnaire include aggressive behavior, ideation, and negative feelings. The total score ranges from 0 to 100. Scores from 0 to 25 indicate a low level of anger, 25 to 50 moderate anger, and ≥ 50 a high level of anger.³² Novaco and colleagues confirmed the consistency in the standardization sample; ($\alpha=0.94$) for the NAS total score and ($\alpha=0.95$) for the provocation inventory (PI) total score. For the NAS subscales, reliability was estimated from ($\alpha=0.76$ to 0.89), with a median value of 0.83. Validity testing demonstrated that NAS-PI scores had substantial correlations in expected directions with scores on other measures of anger and hostility, observers' ratings of angry behaviors, the occurrence of violent behavior, and successful completion of anger management interventions.³² Validity and reliability of this scale were assessed and confirmed in Iran by Malekpour and colleagues, with convergent validity of $r=0.78$ (Buss and Perry correlation test). They also confirmed the content validity and reliability ($\alpha=0.86$) of the scale.³³

The data were analyzed using SPSS software (version 22.0). The *t*-test and Chi-square test were used to compare chronic versus acute headaches in terms of demographic, pain-related, and psychological variables. Logistic regression analysis was conducted to determine the factors affecting headache chronicity. $P<0.05$ was considered statistically significant.

The study was approved by the Ethics Committee of Shiraz University of Medical Sciences, Shiraz, Iran (code: IR.SUMS.REC.1396.S106). All participants were informed about the research project, the confidentiality of any disclosed information, and optional withdrawal from the study. Written informed consent was obtained from all the participants.

RESULTS

A comparison between patients with acute and chronic migraine in terms of demographic characteristics is shown in Table 1. A significant difference ($P<0.05$) between the groups was observed. The highest prevalence of chronic migraine was found among women 153 (90%), married individuals 161 (94.7%), those with a high school education or lower 158 (92.9%), and unemployed participants 143 (84.1%).

The mean pain intensity was not significantly different between the groups ($P=0.18$). However, there was a significant difference in terms of headache duration ($P=0.001$) and disability, depression, anger ($P<0.001$), and emotional intelligence ($P=0.01$). Among the variables, headache duration, severe disability,

severe depression, low emotional intelligence, and high anger levels were significantly higher in patients with chronic migraine than with acute type (Table 2).

Logistic regression analysis was conducted to compare patients with acute and chronic migraine in terms of demographic, pain-related, and psychological variables (Table 3). The backward stepwise selection method (likelihood ratio) was used to enter variables into the analysis. Variables with the lowest value were used as the baseline in the regression model. Variables that had a significant effect on headache chronicity were sex, marital status, education, headache duration, disability, depression, and anger ($P<0.05$). However, others (age, occupation, severity of pain, emotional intelligence) did not have a significant effect ($P>0.05$).

Table 1: Comparison of demographic variables between patients with acute and chronic migraine

| Variables | | Chronic migraine (n, %) | Acute migraine (n, %) | P value* |
|----------------|-------------|-------------------------|-----------------------|----------|
| Sex | Male | 17 (10) | 35 (43.8) | 0.01 |
| | Female | 153 (90) | 45 (56.2) | |
| Marital status | Single | 9 (5.3) | 23 (28.8) | 0.02 |
| | Married | 161 (94.7) | 57 (71.2) | |
| Education | High school | 158 (92.9) | 50 (62.5) | 0.01 |
| | University | 12 (7.1) | 30 (37.5) | |
| Employment | Employed | 27 (15.9) | 41 (51.2) | 0.02 |
| | Unemployed | 143 (84.1) | 39 (48.8) | |

*Chi-square

Table 2: Comparison of pain-related and psychological variables between patients with acute and chronic migraine

| Variables | | Chronic migraine | Acute migraine | P value |
|------------------------|---------------|------------------|----------------|----------|
| | | Mean±SD | Mean±SD | |
| Pain intensity | | 8.89±1.07 | 8.69±1.20 | 0.18* |
| Headache duration | | 10.26±6.60 | 4.43±2.24 | 0.001* |
| | | N (%) | N (%) | |
| Disability | Low-mild | 31 (18.2) | 32 (40) | <0.001** |
| | Moderate | 39 (22.9) | 25 (31.2) | |
| | Severe | 100 (58.8) | 23 (28.8) | |
| Depression | Low-mild | 9 (5.3) | 19 (23.8) | <0.001** |
| | Moderate | 31 (18.2) | 20 (25) | |
| | Fairly severe | 35 (20.6) | 21 (26.2) | |
| | Severe | 95 (55.9) | 20 (25) | |
| Emotional intelligence | Low | 111 (65.3) | 39 (48.8) | 0.01** |
| | High | 59 (34.7) | 41 (51.2) | |
| Anger | Low | 9 (5.3) | 15 (18.8) | <0.001** |
| | Moderate | 25 (14.7) | 24 (30) | |
| | High | 136 (80) | 41 (51.2) | |

*t test, **Chi-square

Table 3: Demographic, pain-related, and psychological variables affecting headache chronicity

| Variable | B ^a | OR ^b | CI ^c | P value* |
|------------------------|----------------|-----------------|-----------------|----------|
| Age | -0.02 | 0.97 | 0.93-1.01 | 0.26 |
| Sex | 1.76 | 5.81 | 2.20-12.69 | 0.02 |
| Marital status | 1.32 | 3.77 | 1.21-11.69 | 0.02 |
| Education | -1.31 | 0.26 | 0.08-0.84 | 0.02 |
| Occupation | 0.25 | 1.28 | 0.28-5.74 | 0.73 |
| Severity of pain | 0.02 | 1.02 | 0.70-1.49 | 0.89 |
| Headache duration | 0.42 | 1.53 | 1.27-1.84 | <0.001 |
| Disability | -1.26 | 0.28 | 0.12-0.65 | 0.003 |
| Depression | 1.29 | 3.66 | 1.50-8.89 | 0.004 |
| Emotional intelligence | -0.21 | 0.8 | 0.35-1.84 | 0.61 |
| Anger | 1.61 | 5.04 | 2.16-11.79 | <0.001 |

*Logistic regression, ^aSlope coefficient, ^bOdds ratio (chronic/acute migraine), ^cConfidence interval

DISCUSSION

The main objective of the study was to compare patients with acute and chronic migraine in terms of demographic, pain-related, and psychological variables. Additionally, we investigated factors affecting headache chronicity in such patients. In line with previous studies,^{16, 34} we found that female and married participants were more likely to suffer from chronic migraine compared to their counterparts. Moreover, the mean age of the participants with chronic migraine was higher than those with acute migraine. In agreement with another study,²³ the results showed that participants with chronic migraine had a lower level of education than those with acute migraine. Evidently, those with a higher level of education are better equipped to deal with pain and therefore less at the risk of developing headache chronicity.

The results showed that a higher number of unemployed participants (housewives, retired) suffered from chronic than from acute migraine. This was in contrast with another study that reported a higher percentage of employed individuals with chronic or acute migraine compared to students and housewives.¹⁶ However, common in both studies was the fact that employed individuals suffered more from acute than from chronic migraine. This discrepancy between the studies could be due to cultural differences and education level.³⁵ The latter was confirmed by our results which showed that housewives

with a low level of education were more prone to chronic migraine. As reported in a previous study,⁵ we also found no significant difference in pain intensity between patients with acute and chronic migraine. This might be due to the fact that all patients who referred to the clinics, as in-patient or outpatient, experienced a high degree of pain intensity regardless of the diagnosis or type of pain.

The results showed that disability and depression were higher in patients with chronic migraine compared to those suffering from the acute type. Some other previous studies also found that patients with chronic migraine experienced greater disability compared to those with acute migraine.^{12, 36} It seems that because patients with chronic migraine experience more frequency of pain than those with acute migraine, they also display more symptoms of depression and disability. A previous study also reported a relationship between the frequency of the headaches and depression in patients with migraine.³⁷ In addition, a relationship between depression and disability with the chronicity of pain in patients with migraine was also reported.^{10, 16, 27}

The results of the present study showed that more than half of the patients with chronic migraine had low emotional intelligence. According to a previous study, people with a high level of emotional intelligence could better control stress with greater self-awareness, self-regulation, and social

awareness.³⁸ Since people with emotional intelligence experience lower levels of stress on a daily basis, and given the close relationship between stress and pain, the relationship between emotional intelligence and pain chronicity seems reasonable. Further studies on the differences between patients with chronic and acute migraine in terms of emotional intelligence could help to confirm or reject the results of the present study. On the other hand, the results of the logistic regression analysis showed no significant correlation between pain chronicity and emotional intelligence. It indicated the probability that headache chronicity had an effect on other variables with similar criterion as emotional intelligence. However, it does not seem justified to give the regression analysis the final verdict on the associations of different variables to the criterion, and thus further research is necessary.³⁹

In line with a previous study,²⁷ the results showed that more than half of the patients with chronic migraine had high levels of anger. Several studies have shown that patients suffering from migraine have excessively controlled personalities, which presents them as reasonable and acceptable people. They often conceal anger due to social and ethical norms. Moreover, patients with migraine often deny their anger and do not express their feelings despite experiencing anger, which leads to emotional suppression.⁴⁰ Constant suppression of anger by patients with chronic migraine exacerbates and prolongs their migraine headaches. However, we recommend further studies on the role of anger in the etiology of chronic pain.

The main strength of the present study was the inclusion of all relevant parameters in examining their effect on the headache chronicity. In terms of study limitations, assessing psychological variables based only on self-report questionnaires might have negatively influenced our findings. Moreover, the inclusion of participants from a single-center prevented generalization of the findings. In addition, the high number of

items in the questionnaires were cumbersome and resulted in less cooperation by the participants. Prospective research with larger samples and of better methodological quality is recommended.

CONCLUSION

Variables that affected headache chronicity in migraine patients were female gender, married status, lower level of education, headache duration, disability, depression, and anger. It is recommended to plan educational programs, decrease disabilities, and teach life skills to such patients to lower the risk of depression and improve anger management. Interventions to promote health and quality of life would prevent the development of headache chronicity in patients with migraine.

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