

Pain catastrophizing in migraine patients and associated factors

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ABSTRACT

Aim: We carried out this study to examine the level of pain catastrophizing (PC) among migraine patients and factors possibly affecting PC.

Material and Method: The sample of this study comprised 120 patients who applied to the neurology clinic of a state hospital and were diagnosed with migraine by the International Headache Society's (IHS) criteria between April 2017 – March 2019. Then, we collected the data from those meeting the inclusion criteria using a socio-demographic information form, the Pain Catastrophizing Scale (PCS), and the Barrat Impulsiveness Scale Short Form (BIS-11-SF). Data analysis was performed on the SPSS 25.0 statistics software. To explore the relationships between the variables, we ran one-way ANOVA and multiple regression analyses and calculated Pearson's correlation coefficients.

Results: We divided the participants into three groups: Group 1 included 30 patients who got full benefit from the treatment during a migraine attack (25%); Group 2 included 25 patients who were unable to obtain any benefit from the treatment at all (20.8%); Group 3 included 65 patients with partial benefit from the treatment (54.17%). The PCS scores were higher in Group 1 and Group 3, while Group 2 had significantly higher PCS total and Rumination scores than Group 1. The number of attacks and impulsiveness levels of the patients explained 18.6% of the variance in PC.

Conclusion: The cognitive capacity of individuals is essential in identifying the prognosis of migraine. Catastrophizing pain is likely to lower treatment response in migraine patients. Besides, the increased number of attacks and impulsiveness levels of patients influence their PC levels. Finally, migraine is a disorder with a psychiatric aspect; therefore, performing appropriate mental evaluations and offering necessary psychiatric support may enhance the chance of success in migraine treatment.

Keywords: Migraine, pain catastrophizing, clinical aspects, impulsiveness

INTRODUCTION

The International Headache Society (IHS) defines migraine as a type of primary headache. While migraine prevalence varies by society, it is estimated between 12.1-16.4% worldwide and more common among females (1,2). In migraine, a headache occurs in attacks, settles on one side, has a throbbing effect, and can continue for up to 72 hours. The pain can be accompanied by some neurologic, autonomic, and gastrointestinal system symptoms (3). The severity of clinical symptoms generally follows a mild to severe course. Headache and other accompanying symptoms adversely impact quality of life among individuals. According to the Global Disease Burden study, migraine ranks the seventh among all diseases that cause disability and the first among neurological disorders (4,5).

The primary symptom affecting the functionality of migraine patients is a headache. The perception of pain depends on bio-psycho-social factors, which determine the prognosis of the disease (6). In parallel with the pain, the concept of pain catastrophizing (PC), which is defined as having negative cognition and emotions about pain, is indicated as a risk in chronicization of migraine symptoms (7). People catastrophizing pain are trapped in constant pain and thoughts about pain. They cannot end their exaggerated negative thinking about pain and believe they have nothing to do to perish the pain (8). Previously, the presence of PC in migraine patients was found to be correlated with the increased number of and prolonged attacks, reduced treatment response, increased number of medical consultations, and impaired quality of life (9,10).

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According to Goli et al. (11) PC contributes to developing depressive and anxious symptoms in migraine patients. Many studies suggested that PC adversely affects clinic outcomes in migraine; however, few attempted to examine how or why PC occurs.

The research foci are often on the impacts of the psychiatric aspects of migraine and accompanying mental complaints on its prognosis. Substantial evidence showed that the most common accompanying psychiatric disorders to migraine are depression and anxiety disorder (12,13). Moreover, some studies demonstrated that migraine patients have cognitive impairments (14) and more frequently experience negative affections such as embarrassment, anger, and guilt (15). The research exploring the personality traits of migraine patients reports that neurotic and impulsive traits are more common and adversely affect the prognosis of the disorder (16,17). On the other hand, impulsiveness is a thought or behavior pattern that one may externalize without anticipating its outcomes, often leading them into an undesirable situation. It is not solely an indicator of pathology but is shown as a reason for developing many psychopathologies (18). Accordingly, the relevant literature previously suggested that impulsiveness could be a variable influencing PC. Yet, no study has attempted to investigate the relationship between PC in migraine patients and impulsiveness

Ultimately, we carried out the study with migraine patients having obtained benefits from relevant treatment at varying degrees. The main purpose of the study was to examine PC and impulsiveness levels in migraine patients. We also sought answers to how clinical aspects of migraine and impulsiveness affect PC. As it causes chronicization of migraine, understanding the underlying reasons for PC occurrence and development and, thus, creating an appropriate treatment plan will likely increase treatment success.

MATERIAL AND METHOD

The sample of the present research, which was a cross-sectional and descriptive study, comprised the patients who applied to the neurology clinic of a state hospital and were diagnosed with migraine based on the IHS criteria between April 2017-March 2019. KTO Karatay University, Non-Pharmaceutical and Non-Medical Device Studies Ethics Committee granted the relevant approval to our study (Date: 30.03.2017, Decision No: 2017/002). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. We carried out the study with only voluntary individuals diagnosed with migraine and aged between 18-65. Yet, we had to exclude those who had a psychiatric history, had a different, pain-related physical disorder, and had a physical or mental disorder adversely influencing filling out a questionnaire

form. Moreover, we did not consider the data of those leaving their forms missing. Eventually, we recruited a total of 120 patients with ongoing polyclinic follow-ups. All of the patients were on prophylactic migraine treatment and received additional treatments in times of attacks. We grouped the participants into three groups depending on their responses to the therapies: Group 1 included those whose complaints were entirely relieved in an attack period, while Group 2 was composed of those without recovering at all and with continuing persistent pains. Finally, Group 3 comprised the patients whose complaints were partially relieved. We informed the participants about the study, obtained their consent to participate in the study, and asked them to fill out a questionnaire booklet covering a socio-demographic information form, the Pain Catastrophizing Scale (PCS), and the Barrat Impulsiveness Scale Short Form (BIS-11-SF).

Socio-demographic Information Form: We prepared the form to include open-ended questions to the participants about their age, educational attainment, occupation, marital status, clinical aspects of migraine attacks, general health condition, and family history.

Pain Catastrophizing Scale (PCS): Sullivan et al. (19) developed the scale to identify the catastrophizing levels of individuals with pain symptoms. The self-report instrument is a Likert-type 13-item scale with three subscales: Rumination, Magnification, and Helplessness. Ugurlu et al. (20) carried out its Turkish validity and reliability study. In their study, the reliability of the Turkish version of the scale ranged between 0.73-0.93. Also, the researchers calculated its Cronbach's alpha value to be 0.95 and the internal consistency coefficient to be 0.83. Analyses pertinent to construct validity and internal consistency of the scale suggested that the scale is a valid and reliable data collection tool in the Turkish context.

Barrat Impulsiveness Scale Short Form (BIS-11- KF): The scale developed to measure individuals' impulsiveness levels was revised by Patton et al. (21). The Likert-type instrument is based on self-report and has 30 items within three subscales: Non-planning Impulsiveness, Motor Impulsiveness, and Attentional Impulsiveness. Tamam et al. (22) adapted the scale into Turkish and found Cronbach's alpha values to range between 0.64-0.82 and high internal consistency coefficient. Analyses pertinent to construct validity and internal consistency of the scale suggested that the scale is a valid and reliable data collection tool in the Turkish context.

Statistical Analysis

We analyzed the data using Statistical Package for Social Sciences (SPSS) for Windows 25.0 (SPSS Inc., Chicago, IL, USA). In the study, we utilized parametric analyses since Skewness and Kurtosis values revealed the data to show a

normal distribution. Then, we ran a one-way ANOVA to compare the scores of the groups on the scales. Next, we calculated Pearson's correlation coefficients to uncover the relationship between the variables. Finally, we performed a multiple regression analysis to determine the predictive value of pain catastrophizing. Multicollinearity assumption was detected to be met considering Durbin Watson, Tolerance, and VIF values. In all statistical analyses, we accepted $p < 0.05$ to be statistically significant.

RESULTS

We carried out the study with a total of eligible 120 patients diagnosed with migraine and divided them into three groups: Group 1 included 30 patients who got full benefit from the treatment during a migraine attack (25%); Group 2 included 25 patients who were unable to obtain any benefit from the treatment at all (20.8%); Group 3 included 65 patients with partial benefit from the treatment (54.17%). The results revealed that sex ($p = .597$), educational attainment ($p = .293$), age ($p = .392$), accompanying aura ($p = .673$), number of attacks ($p = .225$), disease duration ($p = .673$) did not have an impact on treatment response. In this study, the only variable causing a difference in treatment response was marital status; the results of the Tukey test suggested that married and single individuals did not differ by treatment response, while divorced patients had significantly worse responses to the treatment ($p = .028$). At the same time, we could not find any significant differences between married and divorced patients ($p = .233$). Evaluating the patients in 3 groups based on their treatment responses allowed us to explore possible variables that might influence PC and impulsiveness. The descriptive characteristics of the patients are outlined in **Table 1**.

On the other hand, we determined that the patients in Group 2 catastrophized pain more. In this group, the mean PCS total score was 28.44 ± 13.79 , while the participants obtained a mean score of 12.72 ± 6.15 on the Rumination subscale, 6.36 ± 3.32 on the Magnification subscale, and 9.36 ± 5.41 on the Rumination subscale. The patients in

Group 1 had the PCS total and subscale scores, while their PCS total and Rumination scores were significantly lower than those of Group 2 ($p = .030$ and $p = .003$, respectively). We could not reach significant differences in the scores of Group 3. When it comes to the BIS-11-SF, Group 2 had the highest scores, while other groups did not show any significant difference in their scores. Yet, there was a significant difference between Group 2 and Group 1 by Non-planning scores (Group 2: 27.64 ± 9.22 ; Group 1: 22.90 ± 5.89 ; $p = .035$). **Table 2** present the scores of the groups on the scales.

We then analyzed the variables that might be associated with PC and impulsiveness. Accordingly, we found out that the mean BIS-11-SF total score (number of attacks ($r = .351$) and impulsiveness level ($r = .256$)) was positively correlated with PC. Nevertheless, there was no significant relationship between the number of attacks and disease duration and impulsiveness. **Table 3** presents the correlation table.

Table 1. Demographic data of patients and clinical features of migraine

	Group 1 (n=30)	Group 2 (n=25)	Group 3 (n=65)
Age	39±8.31	32.24±11.42	36.06 ±11.35
Sex			
Female	28	20	57
Male	2	5	8
Marital Status			
Single	5	9	18
Married	25	16	47
Education			
Uneducated	1	0	0
Primary education	14	19	32
High school	9	9	20
University	6	6	13
Aura			
Yes	2	2	6
No	28	23	59
Disease duration (year)	12.33±10.19	7.96±8.25	11.12±8.36
Number of attacks (in a year)	4.67±3.75	8.64±3.86	6.57±4.09

Table 2. PCS and BIS-11-SF scale scores of the patients

	Group 1 (1) (n= 30)	Group 2 (2) (n= 25)	Group 3 (3) (n= 65)	p	F
PCS					
Total	19.03±14.09	28.44±13.79	23.2±13.06	p (1-2); .030*	3.32
Helplessness	9.27±7.04	12.72±6.15	10.69±6.16	.140	1.99
Magnification	4.70±3.43	6.36±3.32	4.74±3.57	.118	2.18
Rumination	5.23±4.38	9.36±5.41	7.51±4.32	p (1-2); .003*	5.65
BIS - 11 - SF					
Total	49.70±12.31	57.84±14.85	53.83±11.92	.063	2.83
Attentional imp.	10.50±3.32	10.48±2.37	11.34±3.34	.345	1.07
Motor imp.	15.97±4.84	18.64±5.1	17.29±4.1	.095	2.41
Non-planning imp.	22.90±5.89	27.64±9.22	24.60±6.4	p (1-2); .035*	3.23

p<.05; * Tukey HSD, BIS-11-SF; Barrat Impulsiveness Scale Short Form, imp.; impulsiveness, PCS; Pain Catastrophizing Scale.

Table 3. The relationship between the number of attacks and the duration of the disease with pain catastrophizing and impulsivity

	1	2	3	4
PCS total (1)	1			
BIS-11-SF total (2)	.351**	1		
Number of attacks (3)	.256**	.097	1	
Disease duration (4)	.170	-.009	.070	1

*p<.05, **p<.01, BIS-11-SF; Barrat Impulsiveness Scale Short Form, PCS; Pain Catastrophizing Scale.

Finally, we performed a multiple regression analysis to explore the predictive values of impulsiveness, demographic variables, and clinical aspects on PC. In this context, we first sought to satisfy the multicollinearity assumption of the analysis. Accordingly, we computed the Durbin-Watson value to be 2.104 and the corrected R2 value to be 0.186, which indicated no multicollinearity in the model. The results of the multiple regression analysis uncovered that sex, educational attainment, aura, number of attacks, disease duration, and impulsiveness were the factors predicting PC. However, we discovered that sex, educational attainment, aura, and disease duration did not have a significant contribution to the variance, while the number of attacks and impulsiveness explained 18.6% of the variance in PC. In other words, a change of 1 unit in the number of attacks caused a change of 0.19 points in the PCS total score, while a change of 1 unit in the BIS-11-SF total score caused a change of 0.37 points on the PCS. The regression model is demonstrated in **Table 4**.

Table 4. Multiple regression: factors affecting catastrophizing pain

	Model 1		
	B	S.E.	β
Sex	2.272	3.649	.055
Education	-2.132	1.099	-.186
BIS - 11 - SF	.398	.093	.373**
Aura	1.046	4.377	.021
Number of attacks	.647	.295	.189**
Disease duration	.184	.136	.119
R		.476	
R2		.227	
Adj.R2		.186	
R2 change		.227	

*p<.05, **p<.01, BIS-11-SF; Barrat Impulsiveness Scale Short Form, Adj.R2; Adjusted R2

DISCUSSION

We concluded that the level of treatment response changed with varying modes of perception of pain in migraine patients. Accordingly, the patients who did not respond to treatment at all catastrophized their pains more and had more negative ruminative thoughts about pain. Besides, two important factors leading the patients to catastrophize their pains were found to be impulsiveness level and the number of attacks.

Despite available research, there are still areas in the dark about the etiology and treatment of migraine. Differentiations in treatment types and responses are believed to be linked with such uncertainty. Studies on the factors causing migraine to become chronic yielded different results, which might be attributed to the study location, patients’ characteristics, and methodological issues. Wiendels et al. (23) demonstrated that sex does not influence treatment response, while Scher et al. (24) reported that female sex is a risk factor for the chronicization of headache. In addition, Seferoğlu (25) demonstrated that age and sex do not alter the clinic course of migraine, yet individuals with lower educational attainment experience elevated chronicization. Many studies determined that being married enhances adherence to therapy and treatment success (26,27). In this study, among the demographic variables, we found only being divorced to be a factor to deteriorate treatment. Divorce is a process that requires adaptation to a changing situation, which may be challenging to maintain mental health. Therefore, being divorced may be a variable that can trigger headaches and make it harder to respond to the treatment. From this perspective, the results of our study seem to be in parallel to the literature.

Pain catastrophizing is a cognitive error that disrupts patients’ pain perception and clinic progress in pain (28). According to Shim et al. (29) those with poor ability to recognize and express their emotions tend to catastrophize their headache. Bond et al. (9) asserted that an increased number of and prolonged attacks and higher pain sensitivity increase PC level in migraine. Gil-Martinez et al. (30) determined that PC intensifies pain in chronic migraine patients and that individuals with disrupted functionality due to pain are likely to catastrophize it more. Alvarez-Astorga et al. (31) reported that the presence of PC increases the severity of a headache and facilitates the occurrence of mental complaints such as depression and anxiety. Ultimately, previous research suggests that migraine and PC have a reciprocal relationship where PC is a factor that disrupts the clinic course of migraine. In parallel to the literature, we found that PC levels were higher in the patient group with worse treatment response, and this group significantly differed from the group fully responding to the treatment. In disorders characterized by persistent pain, like migraine, individuals can have a negative cognition about pain, which may worsen the pain, ruin treatment response, and, thus, lead the patients to catastrophize pain more.

The relationship between migraine and PC is highly scrutinized in the literature. Yet, studies are limited on the reasons for PC occurrence. Some studies claim

that the primary issue in catastrophizing pain is about attention. The inability to distract the focus away from pain may aggregate pain perception and sensitivity to pain (32). According to Borsook et al. (33) the structural and functional changes led by migraine may cause PC. In brain imaging procedures in migraine patients, individuals catastrophizing pain have diminished gray substance under the somatosensory cortex, medial and dorsolateral prefrontal cortex, medial temporal cortex, and frontal cortex (34,35). Mathur et al. (36) demonstrated that insula activity is often distinctively impaired in migraine patients with PC. As imaging procedures are not longitudinal, the question of whether PC occurs because of the structural impairments in the brain or structural-functional impairments remains unanswered. A noteworthy finding of our study was that two variables predicted PC occurrence at the rate of 18.6%: the number of attacks and impulsiveness. The literature hosts some studies on the number of attacks and PC levels among patients (9,37); nevertheless, these studies did not address the impact of the number of attacks on PC. An increased number of attacks may cause individuals to be subject to more pain, foster negative opinions about pain, and adversely affect quality of life. Increasing unpleasant thoughts about pain can also disrupt the pain perception and lead to pain catastrophizing. Again, we did not encounter any study exploring the impacts of impulsiveness on PC in migraine patients

Studies that examined impulsiveness in migraine patients yielded varying results. While some reported migraine patients are more impulsive (38), others suggested impulsiveness along with pain is less common (3). According to Sanchez et al. (40) what determines impulsiveness in migraine patients is the pain becoming chronic. Prolonged pain deteriorates quality of life and represses personality traits, such as novelty seeking, pleasure, and impulsiveness in people. In this study, the impulsiveness scores of the patients did not differ significantly, but only Group 2 had significantly higher scores on the Non-planning Impulsiveness subscale. The regression analysis identified impulsiveness as a factor affecting PC, which may be explained by the desire to get rid of the pain in the shortest time possible and the inability to tolerate migraine pain.

CONCLUSION

Pain management is essential in identifying treatment responses in migraine patients. Migraine patients showing non-response to the treatment during pain attacks are likely to catastrophize their pain more. Besides, the number of attacks and impulsiveness affect PC in migraine patients. Identifying factors that might alter pain perception and lead to PC may be

critical for managing migraine. Therefore, psychiatric examinations in addition to neurological treatments, as well as additional pharmacologic or psychotherapeutic treatments, will facilitate pain management and improve quality of life among patients.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out following the principles of the Helsinki Declaration and with the approval of the KTO Karatay University Non-Pharmaceutical and Non-Medical Device Studies Ethics Committee (Date: 30.03.2017, Decision No: 2017/002).

Informed Consent: Verbal and written informed consent was obtained from all participated in this study.

Referee Evaluation Process: Externally peer-reviewed.

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