Original article

Early Maladaptive Schemas, Depression, Distress and Discomfort Tolerance in Migraine Headache

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Abstract

Background: Depression and maladaptive schemas were found to worsen the pain experience in individuals with chronic pain. **Objectives:** The aim of the present study was to evaluate the relationship between depressive symptoms, early maladaptive schemas, distress and discomfort tolerance in female patients with migraine. **Methods:** Seventy eight female migraine patients(37 depressed and 41 non-depressed subjects according to BDI scores) and 55 healthy controls were evaluated with Numeric Pain Rating Scale(NPRS),Beck Depression Inventory(BDI),Young Schema Questionnaire-Short Form-3(YSQ-SF-3),Discomfort Intolerance Scale(DIS) and Distress Tolerance Scale(DTS). **Results:** Distress and discomfort tolerance were lower in both migraine groups than control subjects. EMSs were higher in depressed migraine patients than in non-depressed migraine group and non-clinical controls. A positive correlation between BDI and YSQ-SF-3 scores($p<0.001$), a negative correlation between BDI and DIS($p<0.01$), and also a negative correlation between BDI and DTS($p<0.001$) were found among migraine patients. Hierarchical regression analysis revealed that 20% of the depressive symptoms were explained with DIS scores, while explanatoriness raised up to 46% by addition of YSQ-SF-3 scores to the model. **Discussion:** Cognitive interventions for modifying EMSs and improving distress and discomfort tolerance might be added to the treatment strategies in female migraine patients.

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Keywords: Migraine; depression; schema; distress tolerance; discomfort intolerance

Introduction

Migraine is a complex condition progressing with combined neurologic, gastrointestinal, and autonomic symptoms affecting whole body[1]. It has been reported that migraine is a substantially common and disabling disease associated with a wide range of psychiatric comorbidities[2]. It has been shown that major depression increases the risk for migraine and vice versa[3]. As the prevalence of migraine is higher in women than men, the prevalence of depression in migraine patients is reported to be higher especially in women[4]. The risk of depression is claimed to be 2 to 4 folds higher among migraine patients as a result of similar pathophysiologic and genetic mechanisms underlying migraine and depression[5].

According to the Beck's cognitive model of psychopathology, maladaptive self-schemas constitute a vulnerability factor for psychological problems[6]. Young (2003) described early maladaptive schemas (EMSs) as extensive patterns consisting of memories, emotions, cognitions and bodily sensations regarding individuals' relationship with others; and claimed that these schemas might be the core of several psychopatologies[7,8]. Studies have indicated that EMSs were common in patients with chronic depression and some schemas predicted treatment success[9].

It was demonstarted that EMSs were higher in patients who suffer chronic pain compared to the individuals who do not suffer[10]. Studies have shown that abandonment/instability, mistrust/abuse, emotional deprivation, defectiveness/shame and social isolation/alienation schemas were higher in individuals with chronic pain; and patients who suffer chronic pain were exposed higher early emotional maltreatment[11]. Alexithymia, EMSs and depression were found to worsen the pain experience in individuals with chronic pain[12]. It has been reported that a significant part of pain could be explained by self-sacrifice, emotional inhibition, and unrelenting standards/hypercriticalness schemas, and that schema therapy could be used to decrease effect size of headache in patients suffering chronic migraine without aura[13].

Distress tolerance is a psychological skill defining individuals' capacity to cope with distressed situations[14]. In addition, discomfort tolerance is a term defining one's ability to tolerance disturbing bodily conditions[15]. According to Trafton and Gifford (2010), individulas with low tolerance to emotional distress tend to use avoidance ways to eliminate the negative mood[16]. Studies have demonstrated that patients suffering from headache are emotionally and autonomically highly susceptible to pain and psychological stress[17]. It has been found that chronic headache is linked to cognitive anxiety, somatic anxiety, fear and avoidance conditions, and that frequency of headache mediates the relationship between fear of pain and pain tolerance[18]. Also, discomfort intolerance is suggested to have negative consequences such as overuse of health services and increased substance/drug use to avoid disturbing sensations[19].

Numerous studies have shown that there is a high correlation between migraine and depression, and these two disease trigger each other[4,5]. On the other hand, modification of maladaptive schemas have been stated to be helpful in treatment of depression and chronic pain[10,12,13]. However, there is a lack of studies investigating the relationship between depressive symptoms and EMSs in patients with migraine. The primary objective of this study was to compare EMSs of the female migraine patients with healthy

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subjects and to investigate the relationship between depressive symptoms, distress tolerance, discomfort intolerance and EMSs.

Methods

Participants

In this study, a total of 78 female patients followed up in Bursa Yuksek Ihtisas Training and Research Hospital, Neurology Outpatient Clinic with the diagnosis of migraine type headache were evaluated. Since the prevalence of both migraine and depression are higher in women, only female patients with migraine were included in the study. A semi-structured interview performed by a neurologist and a psychiatrist was used for a detailed clinical history, and diagnosis of migraine was established by a neurologist according to the International Classification of Headache Disorders(ICHD-3)[20]. The inclusion criteria were being female, at least primary school graduated, followed-up with the diagnosis of migraine for at least one year, aged between 18-65 years and volunteer to participate. Patients with a neurodevelopmental and neurocognitive disorder, alcohol or substance abuse, and active psychotic or manic period were excluded from the study.

Data of the first 30 subjects were utilized in order to determine the number of participants who should be enrolled in the study. According to the data obtained from these patients, a significant correlation was found between BDI and YSQ-SF-3 at the level of r=0.395. In the current study, α (two-tailed) value was accepted as 0.05, β as 0.05, and r as 0.395 and the standard normal deviation value was calculated as Z α=1.960 for α, as Z β=1.645 for β, and C value found as $0.5*1n[(1+r)/(1-r)] = 0.418$ [21]. Finally, size of normal sample for this study was found as minimum 77 participants ($N=[(Z\alpha + Z\beta) / C] 2+3$).

In order to compare data of the female migraine patients, a total of 55 healthy female participants aged between 18-65 years without any chronic pain who met the inclusion criteria were evaluated. Participants in the healthy control group were randomly included in the study among healthy individuals who presented to the Health Council of the hospital in order to obtain medical board report for job application. This study was approved by local ethics committee of the hospital in accordance with the ethical standarts of the Helsinki Declaration(2011-KAEK-25 2018/06-40). Written informed consent were obtained from all participants.

Assessment

Sociodemographic and clinical data forms were filled by the researcher in order to evaluate characteristics of the participants such as age, gender, and clinical variables of migraine. Pain intensity of migraine was evaluated by Numeric Pain Rating Scale. Face-to-face interviews were performed and Beck Depression Inventory(BDI) were applied to all subjects to evaluate the cognitive, emotional and behavioral component of depressive symptoms rather than psychophysiological symptoms. Migraine patients were divided into two groups as depressed and non-depressed migraine groups according to BDI scores. In order to evaluate EMSs, self-report Turkish version of YSQ-SF-3 was used. Discomfort Intolerance Scale and Distress Tolerance Scale were used to assess tolerance to psychological distress and physical discomfort.

Numeric Pain Rating Scale (NPRS)

NPRS is a single numeric scale consisting of 11 points[22]. A person scores the scale as '0' if she/he had no pain within the last 24 hours or on average, and '10' Points if he/she had the worst imaginable pain. The points that can be received from this scale vary between 0 and 10.

Beck Depression Inventory (BDI)

The scale was developed by Beck et al. in 1961 in order to measure depressive symptoms[23]. The study was adapted to Turkish and cut-off value of the scale was determined as 17 points. The scale consists of 21 items, and total score that can be received from the scale vary between 0 and 63. Higher scores indicate increased severity of depressive symptoms. Validity coefficient of BDI was found as 0.63[24].

Young Schema Questionnaire-Short Form– 3 (YSQ-SF-3)

The scale was developed by Young et al. (2003) in order to measure early period maladaptive emotional and cognitive patterns[7]. In adaptation of YSQ-SF-3 to Turkish population, it was found that the scale consists of 14 subscales; Cronbach's α coefficients of the subscales vary between 0.53-0.81, and test-retest reliability coefficients of the subscales vary between 0.66-0.83[25]. The scale consists of 90 questions with each question score ranges from 1 to 6 points. Higher scores indicate increased EMSs of the individual. The YSQ-SF-3 consists of 14 subscales as Emotional Deprivation, Failure to Achieve, Pessimism, Social Isolation/ Alienation, Emotional Inhibition, Approval Seeking, Dependence/ Incompetence, Enmeshment/Insufficient Self-Control, Self-Sacrifice, Abandonment, Self-Punitiveness, Defectiveness/Shame, Vulnerability to Harm, and Unrelenting Standards.

Discomfort Intolerance Scale (DIS)

DIS was developed in order to measure skills of tolerance against physical restlessness and discomforting bodily conditions[26]. In Turkish adaptation of the scale it was found that the scale consists of two subscales as "discomfort intolerance" (e.g. "I can tolerate a great deal of physical discomfort" – reverse scored), and "discomfort avoidance" (e.g. "I take extreme measures to avoid feeling physically uncomfortable); and Cronbach's α coefficients of the subscales were 0.67 and 0.60, respectively[15]. Questions range from 0 (not at all like me) to 6 (extremely like me). Items 3, 6 and 7 are inversely scored, and higher scores indicate increased skill of discomfort tolerance of the individual.

Distress Tolerance Scale (DTS)

DTS was developed by Simons & Gaher in order to measure skills of coping with negative psychological conditions[14]. Items reflect an individuals' perceived ability to tolerate distress (e.g., I can't handle feeling distressed or upset), how individuals subjectively appraise emotional distress (e.g., My feelings of distress or being upset are not acceptable), how an individual's attention is absorbed by negative emotion (e.g., My feelings of distress are so intense that they completely take over) and an individual's effort to alleviate distress (e.g., When I feel distressed or upset, I must do something about it immediately). In Turkish validity of the scale, it was found that the scale consists of three factors including Tolerance (Cronbach's α = 0.90), Regulation (Cronbach's α = 0.80), and Self-Efficacy (Cronbach's α = 0.64), and DTS Cronbach's α was found as 0.89[27]. The scale consists of 15 items with each is scored between 1 to 5 points. Higher scores indicate a higher tolerance to distressing emotional states.

Statistical Analysis

In the present study, sociodemographic data of the study group were analyzed with descriptive methods such as mean, standard deviation, frequency and percentage. Chi-square test was used in comparison of categorical variables between depressed and non-

depressed female migraine patients. Independent groups t test was used in comparison of NPRS scores between depressed and non-depressed female migraine patients. One Way ANOVA test was used to compare BDI, DIS, DTS and YSQ-SF-3 scores among three groups. Paired comparisons among the three groups was made using Tukey test. Pearson's Correlation Analysis was used to investigate the correlations between NPRS, BDI, DIS, DTS and YSQ-SF-3 scores. Hierarchical regression analysis was used to evaluate the explanatoriness of BDI scores by DIS, DTS, and YSQ-SF-3 scores in migraine patients and the control group. Normality assumption was met for Independent groups t test, One Way ANOVA analysis, Pearson's Correlation analysis and Hierarchical regression analysis. Data were analyzed utilizing SPSS version 22.0 software(IBM Corporation, Armonk, NY, USA). $p < 0.05$ values were considered statistically significant.

Results

Clinically significant depression was found in 37 (47.4%) of the female migraine patients according to BDI scores. The mean age was 36.7 ± 7.41 years in depressed migraine patients (BDI > 17); 36.05 ± 8.13 years in non-depressed migraine patients(BDI ≤ 17) and 35.82 ± 4.39 years in control group, and no statistically significant difference was found between the three groups ($F = 0.20$, $p = 0.816$). Sociodemographic features of the participants are shown in Table 1. According to the comparison among three groups; the differences in terms of DIS ($F = 4.18$, $p = 0.017$), and DTS ($F = 21.22$, $p < 0.001$) scores were statistically significant. The mean DTS-total and DIS-total scores were similar between depressed and non-depressed female migraine patients according to the Tukey test. There were statistically significant differences between the three groups in terms of DIS-tolerance ($F = 8.82$, $p < 0.001$); DIS-total ($F = 21.22$, $p < 0.001$), and tolerance ($F = 15.63$, $p < 0.001$), regulation ($F = 31.17$, $p < 0.001$) and self-efficacy ($F = 28.58$, $p < 0.001$) subscale scores of DTS (Table 2).

There were statistically significant difference among the three groups in terms of mean YSQ-SF-3 scores(from the highest to the lowest) in depressed migraine patients, non-depressed migraine patients, and control group ($F = 23.61$, $p < 0.001$). YSQ-SF-3 subscale scores of Enmeshment/Insufficient Self-control, Self-punitiveness and Approval Seeking were statistically significantly higher in both depressed and non-depressed migraine groups than control group. Self-sacrifice schema score was statistically significantly higher in depressed migraine group than other groups (Table 2).

No statistically significant correlation was found in NPRS and BDI, DTS, DIS and YSQ-SF-3 scores among female migraine patients, according to the Pearson's correlation analysis. A negative correlation was found between the mean BDI and DIS scores ($r = -0.31$, $p < 0.005$), a negative correlation between the mean BDI and DTS scores ($r = -0.37$, $p < 0.05$), and a positive correlation between the mean BDI and YSQ-SF-3 scores ($r = 0.62$, $p < 0.001$). There was a negative correlation between DTS and YSQ-SF-3 scores ($r = -0.42$, $p < 0.005$) (Table 3).

According to the hierarchical regression analysis; 20% of BDI scores in female migraine patients were explained by DIS and DTS scores ($p < 0.001$), while the explanatoriness raised up to 46% when YSQ-SF-3 scores added to the model ($p < 0.001$). The factors affecting explanatoriness in the final model were DIS ($p < 0.01$) and

Table 1. Comparison of demographic data between depressed migraine patients, non-depressed migraine patients and control group.

		Female Migraine Patients		Control Group n(%)	Chi-square	p
		Depressed BDI>17 (n=37)	Non-Depressed BDI≤17 (n=41)			
Education n(%)	Primary	29 (78.4)	29 (70.7)	41 (74.5)	0.65	0.957
	High	5 (13.5)	7 (17.1)	8 (14.5)		
	Above	3 (8.1)	5 (12.2)	6 (10.9)		
Income status n(%)	High	8 (21.6)	14 (34.1)	6 (10.9)	15.64	0.004*
	Middle	25 (67.6)	26 (63.4)	49 (89.1)		
	Low	4 (10.8)	1 (2.4)	0 (0)		
Employment n(%)	Unemployed	19 (51.4)	22 (53.7)	3 (5.5)	52.31	<0.001**
	Worker	15 (40.5)	12 (29.3)	52 (94.5)		
	Officer	2 (5.4)	3 (7.3)	0 (0)		
	Retired	1(2.7)	2 (4.9)	0 (0)		
	Other	0 (0)	2 (4.9)	0 (0)		
Marital status n(%)	Single	34 (91.9)	36 (87.8)	35 (63.6)	23.33	<0.001**
	Married	1 (2.7)	3 (7.3)	20 (36.4)		
	Divorced	2 (5.4)	2 (4.9)	0 (0)		
Duration of disease n(%)	1-5 years	14 (37.8)	16 (39.0)	-	0.082	0.960
	5-10 years	11 (29.7)	11 (26.8)	-		
	More than 10 years	12 (32.4)	14 (34.1)	-		
Type of migraine n(%)	With aura	23 (62.2)	17 (41.5)	-	3.335	0.068
	Without aura	14 (37.8)	24 (58.5)	-		
Migraine attack frequency n(%)	More than once per week	20 (54.1)	14 (34.1)	-	8.118	0.017*
	More than once a month	17 (45.9)	20 (48.8)	-		
	Less than once per month	0 (0)	7 (17.1)	-		
Migraine attack duration n(%)	1-24 hours	10 (27.0)	14 (34.1)	-	0.463	0.496
	24-72 hours	27 (73.0)	27 (65.9)	-		

*<0.01, **<0.001, BDI= Beck Depression Inventory

YSQ-SF-3 scores ($p < 0.001$). It was found that DIS and DTS scores were not effective in explanation of BDI scores in the control group, and explanatoriness significantly increased to 9% when YSQ-SF-3 scores were added to the model. In the final model, the only significant factor in explanation of BDI scores in the control group was DIS scores ($p < 0.05$) (Table 4).

Discussion

In the present study, it was found that 47,4% of the participants with migraine have clinical depression, and ability to tolerate distress and discomfort decreased but EMSs increased as the depressive symptoms increased in female migraine patients. EMSs were higher in depressed migraine patients than in non-depressed migraine group and non-clinical controls. According to the hierarchical regression analysis EMSs, discomfort and distress tolerance were effective predictors of depressive symptoms among female migraine patients.

Studies have shown that nearly half of migraine patients were accompanied by depression, and more than half of migraine patients were accompanied by depressive disorders[4,5]. Corallo et al. (2015) showed that female gender is a major risk factor associated with depressive symptoms and pain intensity in migraine patients[28]. In the current study, presence of depressive symptoms in 47.4% of migraine patients is consistent with the previous findings.

Previously, it was demonstrated that cognitive anxiety, somatic anxiety, fear and avoidance were correlated with pain tolerance in patients with chronic tension-type headache but not in patients with migraine and headache-free controls[18]. Preceding findings also indicate that EMSs and depression seems to worsen pain

Table 2. Comparison of BDI, DIS, DTS, YSQ-SF-3 total and YSQ-SF-3 subscale mean scores between depressed migraine patients(DMP), non-depressed migraine patients(NDMP)and control group

	Depressed Migraine Patients BDI>17 (n=37)	Non-depressed Migraine Patients BDI≤17 (n=41)	Control Group (n=55)	F	p
	Mean/Sd	Mean/Sd	Mean/Sd		
BDI[a]	25.65±7.37	9.61±4.14	7.51±3.89	151.02	<0.001**
DIS-total[b]	20.14±7.28	23.78±7.23	25.95±11.87	4.18	0.017
DIS-Tolerance[b]	9.86±4.88	12.32±5.16	15.44±7.80	8.82	<0.001**
DIS-Avoidance[c]	10.27±5.05	11.41±4.64	10.87±4.42	0.58	0.560
DTS-total[b]	38.84±11.31	46.46±12.38	58.67±17.98	21.22	<0.001**
DTS-Tolerance[b]	23.08±8.41	28.22±8.83	34.40±10.91	15.63	<0.001**
DTS-Regülasyon[b]	8.32±3.11	8.12±3.63	12.84±3.21	31.17	<0.001**
DTS-Self-Efficacy[d]	7.76±2.30	9.39±2.64	12.13±3.19	28.58	<0.001**
YSQ-SF-3 total[e]	271.59±62.60	208.53±44.68	189.07±62.12	23.61	<0.001**
Emotional Deprivation[e]	14.57±5.97	9.93±5.32	11.64±5.09	7.26	0.001*
Failure to Achieve[e]	16.86±7.05	10.80±3.93	11.82±4.86	14.57	<0.001**
Pessimism[e]	18.05±5.00	12.17±5.04	10.71±5.05	24.75	<0.001**
Social Isolation/Alienation[e]	21.51±6.93	14.80±5.71	13.00±5.00	24.85	<0.001**
Emotional Inhibition[e]	13.86±5.74	11.12±5.54	10.95±4.13	4.21	0.017
Approval Seeking[f]	21.38±6.47	18.49±6.42	13.36±5.66	20.22	<0.001**
Dependence/Incompetence[e]	23.68±7.30	16.12±5.53	16.29±4.47	22.83	<0.001**
Enmeshment/Insufficient Self-Control[f]	21.49±6.96	19.12±6.04	13.73±5.10	20.83	<0.001**
Self-Sacrifice[a]	20.24±5.66	16.93±5.15	12.47±5.69	22.68	<0.001**
Abandonment[e]	12.84±5.71	9.27±4.15	10.64±5.00	5.05	0.008*
Self-Punitiveness[f]	22.27±7.09	19.24±6.40	12.24±5.28	32.44	<0.001**
Defectiveness/Shame[e]	13.27±5.93	9.02±3.19	11.60±4.72	8.14	<0.001**
Vulnerability to Harm[e]	14.68±4.95	10.46±4.69	10.85±4.14	10.34	<0.001**
Unrelenting Standardsc	8.73±3.96	8.78±3.23	7.75±2.67	1.56	0.213

BDI= Beck Depression Inventory, DIS=Discomfort Intolerance Scale, DTS=Distress Tolerance Scale, YSQ-SF-3=Turkish Young Schema Questionnaire-Short Form–3, a= MP with Depression>MP without Depression>Control Group, b= MP with Depression, MP without Depression < Control Group, c= MP with Depression, MP without Depression, Control Group, d= MP with Depression<MP without Depression<Control group, e= MP with Depression>MP without Depression, Control Group, f= MP with Depression, MP without Depression> Control Group.
*<0.01, **<0.001

Table 3. The relationship between NPRS, BDI, DIS, DTS and YSQ-SF-3 scores among female migraine patients (n=78)

	1	2	3	4
1-NPRS	-			
2-BDI	0.03			
3-DIS	-0.08	-0.31*		
4-DTS	0.19	-0.37*	0.21	
5-YSQ-SF-3	-0.02	0.62**	-0.10	-0.42**

NPRS=Numeric Pain Rating Scale, BDI= Beck Depression Inventory, DIS=Discomfort Intolerance Scale, DTS=Distress Tolerance Scale, YSQ-SF-3=Turkish Young Schema Questionnaire-Short Form–3, *<0.01, **<0.001.

Table 4. Hierarchical regression analysis results for BDI scores

Migraine group (n=78)						95% Confidence Interval	
Predictor	R2	Adjusted R2	B	SE	Beta	LL	UL
Step 1							
DIS			-0.33	0.14	-0.25*	-0.61	-0.05
DTS			-0.25	0.08	-0.32**	-0.42	-0.09
	0.20***	0.17***					
Step 2							
DIS			-0.32	0.11	-0.24**	-0.55	-0.09
DTS			-0.06	0.07	-0.08	-0.22	0.08
YSQ-SF-3			0.09	0.01	0.56***	0.06	0.12
	0.46***	0.43***					
Control group (n=55)							
Step 1							
DIS			0.12	0.04	0.31*	0.01	0.19
DTS			-0.05	0.03	-0.24	-0.11	0.00
	0.10	0.07					
Step 2							
DIS			0.12	0.04	0.37*	0.02	0.21
DTS			-0.05	0.03	-0.27	-0.12	0.00
YSQ-SF-3			-0.01	0.00	-0.19	-0.02	0.00
	0.14	0.09*					

BDI= Beck Depression Inventory, DIS=Discomfort Intolerance Scale, DTS=Distress Tolerance Scale, YSQ-SF-3=Turkish Young Schema Questionnaire-Short Form–3, *<0.05, **<0.01, ***<0.001, LL=Lower Limit, UL=Upper Limit, SE=Standard Error

experience[12,29]. This may be a possible explanation of why more than half of depressed female migraine patients in the present study suffer more than one migraine attacks per week. McCracken found that increased attention to pain was related with increased pain severity, emotional distress and psychosocial disability[30]. However, our study findings showed no significant correlation between pain intensity and depression, EMSs, distress tolerance and discomfort tolerance in migraine patients.

Previous studies comparing pain tolerance of patients with headache and control subjects have revealed inconsistent findings[18]. Lethem and colleagues asserted that individuals can choose to confront or avoid pain due to exaggerated pain perception and suggested 'The Fear-Avoidence Model of Pain'[31]. It was found that patients with episodic migraine tend to use functional coping strategies, where patients with chronic type headache mostly use dysfunctional coping strategies (like avoidence, thought supression, etc.)[32]. In a recent study it has been reported that higher depression scores were related to higher pain associated social avoidance scores and lower endurance scores in migraine patients[33]. The fact that DIS and DTS total and subscale scores were lower in both migraine groups than the control group in the current study indicates that the ability to withstand distress and discomfort is lower in individuals with migraine, regardless of the presence of depressive symptoms. However, DIS-avoidance scores were similar in migraine patients and healthy individuals inconsistent with previous literaure. In other words, migraine patients do not exhibit more avoidance behaviors, even if their ability to withstand discomfort is worse. It can be interpreted that migraine patients use functional coping skills similar to healthy individuals by not exhibiting avoidance behavior. Future studies investigating the relationship between clinical features of migraine and psycological factors such as pain coping skills, pain tolerance, anxiety sensitivity and psychological resilience are needed to deeply understand pain-related behaviors among migraine patients.

Studies of EMSs in clinically depressed patients are relatively sparse. Several studies using mixed clinical samples reported significant correlations between most EMSs and depression; however apart from the specific EMSs of abandonment, there is no consensus on what EMSs uniquely contribute to depressive symptoms[9,34]. In a study comparing EMSs in depression and somatization disorder, it was reported that depressed patients exhibited significantly higher scores of maladaptive schemas, including emotional deprivation, mistrust and abuse, social isolation/alienation, defectiveness/shame, failure to achieve, subjugation, emotional inhibition, and insufficient self-control[35]. In concordance with previous findings, scores of emotional deprivation, failure to achieve, emotional inhibition, pessimism, social isolation/alienation, dependence/incompetence, abondenment, defectiveness/shame and vulnerability to harm was found to be higher in depressed female migraine patients than non-depressed migraine patiens and control subjects in present study. It can be speculated that these EMSs might be directly related to depression rather than diagnosis of migraine.

Previous studies have demonstrated that EMSs in patients with chronic pain are similar to those with headache[12,13]; however, the relationship between the presence of comorbid depressive symptoms and EMSs has not been previously discussed in the literature. Insufficient self-control, self-punitiveness and approval seeking schema scores were similarly higher in both depressed and non-depressed female migraine patients than control subjects in the present study. Ribas et al. (2018), reported that unrelenting standarts and self-punitiveness schemas were higher in migraine patients compared to healthy subjects and were especially associated with female gender[36]. In this point of view, insufficient self-control, self-punitiveness and approval seeking schemas are considered to be probably associated with female gender in migraine regardless of the presence of depressive symptoms.

Previously, disconnection and rejection schema domain, namely abandonment/instability, mistrust/abuse, emotional deprivation, defectiveness/shame and social isolation/alienation schemas have been reported to be associated with chronic pain in most severely disabled chronic pain patients[11]. In a study comparing 69 participants with migraine and tension-type headache with

86 non-clinical samples revealed difference between groups in 9 schema domains including emotional deprivation, abandonment/ instability, mistrust/abuse, social isolation/alienation, failure to achieve, enmeshment/undeveloped self, subjugation, self-sacrifice and emotional inhibition[37]. Previous findings point out that emotional deprivation and self-sacrifice schemas are thought to predict inability as the intensity caused by pain[13]. Although the results of the present study did not reveal a significant correlation between early maladaptive schemas, discomfort tolerance, distress tolerance and intensity of migraine pain; since impairment of functionality due to pain was not evaluated in this study, no comment could be made on the relationship between EMSs and pain-related disability. However, self-sacrifice schema scores were higher in depressed migraine patients than non-depressed migraine patients, and higher in non-depressed migraine patients than control subjects. Thus, self-sacrifice schema might be speculated as a common intersection of both depression and migraine headache.

A negative correlation was found between the mean BDI and both DIS and DTS scores, and a positive correlation between the mean BDI and YSQ-SF-3 scores. These findings support the fact that the ability to withstand distress is lower in patients with chronic pain, which has been shown in previous studies, is also valid for migraine patients. Some EMSs are known to be associated with a predisposition to depression, and the prevalence of depression is high in migraine patients[9,13]. In addition, previous findings supporting the relationship between EMSs and pain severity and disability shows that EMS in migraine patients can affect the course of disease, so it is an important point to focus on EMSs in the treatment of migraine.

According to correlation analysis, YSQ-SF-3 scores are positively correlated with BDI scores and negatively correlated with DTS scores. And also, there was a negative correlation between BDI and DTS scores. Thus, hierarchical regression analysis was performed to investigate the predictive power of these factors and which factor is more effective in explaining depressive symptoms in migraine patients. Hierarchical regression analysis revealed that 20% of the depressive symptoms were significantly explained by DIS scores, while explanatoriness raised up to 46% by addition of YSQ-SF-3 scores to the model. DTS and YSQ-SF-3 scores were not found to be significant predictors for the control group. In line with these results, it can be speculated that EMSs and discomfort tolerance are predictors of depressive symptoms in migraine patients. Dogaheh et al.(2015) demonstreted that a series of EMSs could significantly predict 61 percent of the total change in position of tension headaches or migraine; and mistrust/ abuse and self-sacrifice schemas were reliable predictors for migraine and tension-type headaches[37]. It seems remarkable to investigate which EMSs are predictors of migraine headache and the relationship with other clinical characteristics of disease.

One of the limitations of the current study is the cross-sectional design and relatively small sample size. Another limitation is that the presence of clinical depression was not evaluated by clinical interview; instead, only the presence of depressive symptoms was evaluated with the Beck Depression Inventory. Moreover, since the migraine prevalence is higher in women, the inclusion of only female migraine patients to the current study potentially limits the generalizability of the findings to all migraine patients.

Conclusion

Our study findings provide additional support to the importance of EMSs in migraine patients which may be considered as a transdiagnostic factor associated with pain perception and tolerance in chronic headache. Cognitive therapeutic approaches that aim to reduce the negative effects of pain intensity by increasing distress and discomfort tolerance and to modify maladaptive schemes may be beneficial in migraine patients with depressive symptoms. Overall, further studies are needed to examine distress and discomfort tolerance, anxiety sensitivity, early maladaptive schemas and other probable transdiagnostic factors that may be associated with pain experience and pain related disability in migraine headache especially accompanied with depression.

Conflicts of Interest

The authors declare that they have no conflict of interest.

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None to declare.

REFERENCES

1. Çelik DB, Arkar H, İdiman F. Anger and Temperament and Character Characteristics in Patients with Migraine Headache. J Clin Psy. 2010;13(1):23-35.
2. Minen MT, De Dhaem OB, Van Diest AK, Powers S, Schwedt TJ, Lipton R, et al. Migraine and its psychiatric comorbidities. J Neurol Neurosurg Psychiatry. 2016;87:741-49.
3. Breslau N, Lipton RB, Stewart WF, Schultz LR, Welch KMA. Comorbidity of migraine and depression: investigating potential etiology and prognosis. Neurology. 2003;60:1308-12.
4. Ligthart L, Gerrits MM, Boomsma DI, Penninx BW. Anxiety and depression are associated with migraine and pain in general: an investigation of the interrelationships. J Pain. 2013;14:363-70.
5. Amoozegar F. Depression comorbidity in migraine. Int Rev Psychiatry. 2017;29:504-15.
6. Beck AT, Rush AJ, Shaw BF, Emery G. Cognitive therapy of depression. New York: Guilford Press. 1979:425.
7. Young JE. Cognitive therapy for personality disorders: A schema-focused approach. 3rd ed. Sarasota: Professional Resource Press/ Professional Resource Exchange. 1999.
8. Young, JE, Klosko JS, Weishaar ME. Schema therapy: A practitioner's guide. New York: Guilford Press. 2003.
9. Renner F, Lobbestael J, Peeters F, Arntz A, Huibers M. Early maladaptive schemas in depressed patients: Stability and relation with depressive symptoms over the course of treatment. J Affect Disord. 2012;136:581-90.
10. Saariaho T, Saariaho A, Karila I, Joukamaa M. The psychometric properties of the Finnish Young Schema Questionnaire in chronic pain patients and a non-clinical sample. J Behav Ther Exp Psychiatry. 2009;40:158-68.
11. Saariaho TH, Saariaho AS, Karila IA, Joukamaa MI. Early maladaptive schemas in Finnish adult chronic pain patients and a control sample. Scand J Psychol. 2011;52:146-53.
12. Saariaho AS, Saariaho TH, Mattila AK, Karukivi M, Joukamaa MI. Alexithymia and Early Maladaptive Schemas in chronic pain patients. Scand J Psychol. 2015;56(4):428-37.
13. Tavallaii A, Naderi Z, Rezaiemaram P, Tavallaii V, Aghaie M. The relationship between early maladaptive schemas and three dimensions of headache impact in Iranian outpatients with chronic migraine without aura. Int J Behav Sci. 2015;9(3):215-23.
14. Simons JS, Gaher RM. The Distress Tolerance Scale: Development and validation of a self-report measure. Motiv Emot. 2005;29:83-102.
15. Özdel K, Alkar ÖY, Taymur İ, Türkçapar MH, Zamkı E, Sargın AE. Discomfort intolerance scale: A study of reliability and validity. JCBPR. 2012;1:52–8.

16. Trafton JA, Gifford EV. Biological bases of distress tolerance Zvolensky MJ Bernstein A Vujanovic AA (Eds) Distress Tolerance: Theory Research and Clinical Applications. New York: The Guilford Press. 2010:80-103.
17. Lehrer PM, Murphy AI. Stress reactivity and perception of pain among tension headache sufferers. Behav Res Ther. 1991;29:61-9.
18. Bishop KL, Holm JE, Borowiak DM, Wilson BA. Perceptions of pain in women with headache: a laboratory investigation of the influence of pain-related anxiety and fear. Headache. 2001;41:494-99.
19. Cox BJ, Swinson RP, Shulman ID, Kuch K, Reichman JT. Gender effects and alcohol use in panic disorder with agoraphobia. Behav Res Ther. 1993;31:413-16.
20. Headache Classifcation Committee of the International Headache Society. The international classifcation of headache disorders. 3rd edn. (beta version). Cephalalgia. 2013:629-808.
21. Hulley SB, Cummings SR, Browner WS, Grady D, Newman TB. Designing clinical research: an epidemiologic approach. Appendix 6C, 4th edn. Philadelphia: Lippincott Williams Wilkins. 2013;79.
22. Dworkin RH, Turk DC, Farrar JT, Haythornthwaite JA, Jensen MP, Katz NP, et al. Core outcome measures for chronic pain clinical trials: IMMPACT recommendations. Pain. 2005;113:9-19.
23. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. Arch Gen Psychiatry. 1961;4:561-71.
24. Hisli N. The validity and reliability of the Beck Depression Inventory in a Turkish sample. Psikoloji Dergisi. 1988;6:118-22.
25. Soygüt G, Karaosmanoğlu A, Çakir Z. Assessment of Early Maladaptive Schemas: A Psychometric Study of the Turkish Young Schema Questionnaire-Short Form-3. Turk Psikiyatri Derg. 2009;20:75-84.
26. Schmidt NB, Richey JA, Fitzpatrick KK. Discomfort intolerance: Development of a construct and measure relevant to panic disorder. J Anxiety Disord. 2006;20:263-80.
27. Sargın AE, Özdel K, Utku Ç, Kuru E, Alkar ÖY, Türkçapar MH. Distress Tolerance Scale: A Study of Reliability and Validity. JCBPR. 2012;1:152-161.
28. Corallo F, De Cola MC, Lo Buono V, Grugno R, Pintabona G, Lo Presti R, et al. Assessment of anxiety, depressive disorders and pain intensity in migraine and tension headache patients. *Acta Medica Mediterranea*. 2015;*31*:615-20.
29. Carvalho ACF, Poli-Neto OB, Souza Crippa JA, Hallak JEC, Osorio FL. Associations between chronic pelvic pain and psychiatric disorders and symptoms. Arch Clin Psychiatry. 2015;42(1):25-30.
30. Mc Cracken L. 'Attention' to pain in persons with chronic pain: a behavioral approach. Behav Ther. 1997;28:271-84.
31. Lethem J, Slade PD, Troup JD, Bentley G. Outline of a Fear-Avoidence Model of exaggerated pain perception-I. Behav Res Ther. 1983;21:401-08.
32. Wieser T, Walliser U, Womasek I, Kress HG. Dysfunctional coping in headache: Avoidence and endurance is not associated with chronic forms of headache. Eur J Pain. 2012;16:268-277.
33. Ruscheweyh R, Pereira D, Hasenbring MI, Straube A. Pain-related avoidance and endurance behaviour in migraine: an observational study. J Headache Pain. 2019;20:9.
34. Glaser BA, Campbell LF, Calhoun GB, Bates JM, Petrocelli JV. The early maladaptive schema questionnaire-short form: A construct validity study. Measurement and Evaluation in Counseling and Development. 2002;35(1):2-13.
35. Davoodi E, Wen A, Dobson KS, Noorbala AA, Mohammadi A, Farahmand Z. Early maladaptive schemas in depression and somatization disorder. J Affect Disord. 2018;235:82-89.
36. Ribas KHS, Ribas VR, Barros SSM, Ribas VR, Filizola MGN, Ribas RMG, et al. The participation of early maladaptive schemas in the perception of pain in patients with migraine. Dement Neuropsychol. 2018; 12(1):68-74.
37. Dogaheh ER, Yoosefi A, Kami M. Early maladaptive schemas in patients with and without migraine and tension headaches. IRJ 2015;13(4):7-12.