



EMPATHY AND PERFECTIONISM IN MIGRAINE

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ABSTRACT

Objective

Migraine is a common headache disorder which can be seen with personality variables because of the projections effecting the central nervous system. The aim of the study was to investigate the relationship between patients' characteristics and the migraine clinic, the empathy scores, also the perfectionism scores.

Methods

The study performed with (>18 age) 104 healthy individuals for control group and 104 migraineurs. Empathy was determined via "Empathy for Pain Scale" and the perfectionism investigated via "Short Form of Perfectionism Scale". The attack frequency in last 6 months, the duration of attacks, family history of migraine, presence of any chronic disease, prophylactic treatment, use of multiple analgesics and the sociodemographic characteristics of migraineurs were investigated.

Results

Empathy of migraineurs was high according to control group (P = 0.039). Empathy was higher in woman migraineurs than

in man migraineurs (P = 0.038). The childless migraineurs had higher scores of empathy compared to migraineurs with a child/children (P = 0.007). There were no statistically significant difference in terms of perfectionism between the migraineurs and the control group (P = 0.062). Empathy (P = 0.280) and perfectionism (P = 0.765) scores were not different between migraineurs with aura and without aura.

Conclusions

'Empathy for Pain Scale' items of disgust (P = 0.009) and avoidance (P = 0.035) were high in migraineurs than that of the control grup, probably because of increased vicarious sensations (P = 0.041) and vicarious pain (P = 0.003) of these patients. The high frequency of attacks without a family history of migraine (P = 0.015) draws attention to the importance of environmental factors in the frequency of migraine attacks. Besides, probably cigarette user migraineurs' higher oxidative stress is related to decreased empathy (P = 0.010) and also higher frequency of attacks in last 6 months (P = 0.009).

Key Words

Migraine, empathy, perfectionism

ÖZET

Amaç

Migren, merkezi sinir sistemini etkileyen yansımaları nedeniyle kişilik değişkenleriyle birlikte görülebilen yaygın bir baş ağrısı bozukluğudur. Araştırmanın amacı hastaların özellikleri ve migren kliniği, empati puanları, ayrıca mükemmeliyetçilik puanları arasındaki ilişkiyi araştırmaktır.

Yöntemler

Çalışma, (>18 yaş) kontrol grubu için 104 sağlıklı birey ve 104 migrenli hastayla gerçekleştirildi. Empati 'Ağrıya Yönelik Empati Ölçeği' ile ve mükemmeliyetçilik ise 'Mükemmeliyetçilik Ölçeğinin Kısa Formu' ile belirlendi. Migrenli hastaların son 6 aydaki atak sıklığı, atak süresi, ailede migren öyküsü, herhangi bir kronik hastalık varlığı, profilaktik tedavi, çoklu analjezik kullanımı ve sosyodemografik özellikleri araştırıldı.

Bulgular

Migrenli hastalarda empati, kontrol grubuna göre yüksekti ($P = 0.039$). Kadın migrenlilerde empati, erkek migrenlilere kıyasla daha yüksekti ($P = 0.038$). Çocuğu olmayan migrenlilerin empati puanı, çocuğu/çocukları olan migrenlilere göre daha yüksekti ($P = 0.007$). Migrenliler ile kontrol grubu arasında mükemmeliyetçilik açısından istatistiksel olarak anlamlı bir fark yoktu ($P = 0.062$). Auralı ve aurasız migrenlilerde empati ($P = 0.280$) ve mükemmeliyetçilik ($P = 0.765$) puanları farklı değildi.

Sonuç

Migrenlilerde 'Ağrıya Yönelik Empati Ölçeği' nin maddeleri olan başkalarının acısı için hissettikleri tikslenme ($P = 0.009$) ve kaçınmanın ($P = 0.035$) kontrol grubuna kıyasla yüksek olması, muhtemelen bu hastaların dolaylı duyularının ($P = 0.041$) ve dolaylı ağrılarının ($P = 0.003$) artması sonucu olabilir. Migren aile öyküsü olmayan hastalarda atak sıklığının yüksek olması ($P = 0.015$), migren atak sıklığında çevresel faktörlerin önemine dikkat çekmektedir. Bununla

birlikte, sigara kullanan migrenlilerde muhtemelen oksidatif stresin artmış olması sebebiyle empati azalmış ($P = 0.010$) ve son 6 ayda atak sıklığı artmış ($P = 0.009$) olarak tespit edilmiştir.

Anahtar Kelimeler

Migren, empati, mükemmeliyetçilik

INTRODUCTION

Migraine is one of the common headache disorder in the population (Oguz-Akarsu et al., 2019). Although pathophysiologic mechanism of migraine is unclear, it is known that genetic and environmental factors play role in the development of this neurologic disease (Pelzer et al., 2019). Personality variables also have a role in migraine pathophysiology (Cheng et al., 2016). In Wendt's letter (2010) to the editor, it was stated that the level of empathy towards others is high in patients with persistent headache.

The activation of the hypothalamus is known during the earliest phases of migraine (Schulte et al., 2016). There are reciprocal connections between the trigeminocervical complex and the hypothalamus (Robert et al. 2013). The insular cortices also have function in modulating trigeminocervical complex neuronal activity (Goadsby and Holland, 2019) and social functions like empathy (Gogolla, 2017). Empathy is one of the most important factor for a social human being. Empathy is not only understanding others, empathy also has a social integrative feature by creating an altruistic behavior (Cankaya et al., 2020). What is the level of empathy in migraineurs when compared to the healthy control group?

Migraine attacks commonly manifest as unilateral pulsating headache, differ from moderate to severe lasting 4-72 hours (Headache Classification Committee of the International Headache Society, 2018). Primary somatosensory cortex and visual cortical areas also effect trigeminocervical activity (Goadsby and Holland, 2019). Migraine with aura is a focal neurologic disorder with visual, sensory or motor symptoms

(Giffin et al., 2003) and can be seen in about 20-30% of migraineurs (Viana et al., 2017). Are empathy scores different in migraine with and without aura?

In some migraineurs, perfectionism significantly affects the lifestyle and constitutes a serious psychosocial risk factor. Perfectionism is a high level of self-expectation that is incompatible with reality (Langdon et al., 2020). Are perfectionism scores different in migraine with aura and without aura? Sociodemographic characteristics are also important in the prevalence of migraine. The prevalence of chronic migraine is the highest among in mid-life and females (Buse et al., 2012). Is there a relationship between sociodemographic characteristics and the frequency of attacks in the last 6 months, the duration of attacks, the empathy scores, the perfectionism scores?

MATERIAL METHOD

The study approved by The Local Ethics Committee of Ondokuz Mayıs University, Samsun-Türkiye (OMUKAEK No: 2021/109) on 25.02.2021. The Open Epi V 3.1 Statistical Programme was used to estimate the sample size. The power was set at 80% (type II error) and the confidence level at 95%. The survey study was planned at least 39 individuals in each group for investigating empathy (Cankaya et al., 2020), at least 43 volunteer in each group for investigating perfectionism (Rice et al., 2014). When the sample size calculated according to a study investigated migraine symptoms for a period of time, the minimum number of person in each group was 50 (Dallavalle et al., 2020).

The study performed between the dates 26.02.2021 and 31.03.2022 with 104 migraineurs (older than 18 years of age) who had visited Neurology Clinic of Ondokuz Mayıs University, Faculty of Medicine hospital and Neurology Clinic of Health Sciences University, Kanuni Training and Research Hospital and randomly selected 104 healthy individuals (>18 age) without headache attacks for the control group. The migraineurs and the healthy individuals were asked to complete the survey voluntarily. They were guaranteed

complete confidentiality (World Medical Association Declaration of Helsinki, 2008).

Empathy for pain level was determined by the "Empathy for Pain Scale" (Cankaya et al., 2020) and the perfectionism level by the "Short Form of Perfectionism Scale" (Rice et al., 2014). 'Empathy For Pain Scale' has 4 scenarios and each scenario has 12 items which are rated on a scale ranging from 1 to 5 points: 1 = strongly disagree, 5= strongly agree. The scenarios were: (1) a person undergoing a surgical procedure (e.g., as part of a television hospital drama); (2) a person who has recently had a surgical procedure (e.g., they have stitches or bandaged amputation stump); (3) a person being accidentally injured (e.g., in a car accident); and (4) a person being physically assaulted. The 12 response items were "distress, discomfort, disgust, fear, restlessness, sense of compassion, sense of what it feels like, a need to get help, a desire to look away, non-painful sensations, painful sensations and visceral sensations (e.g., nausea)" (Giummarra et al., 2015). The 'Empathy for Pain Scale' measures empathic concern (compassion, need to help, state empathy), affective (distress, discomfort, restlessness, disgust, fear, avoidance, visceral sensations) and sensory dimensions (non-painful and painful vicarious sensations). There is an important note that the survey 'Empathy for Pain' is a novel way for determination of vicarious pain. The vicarious pain was only correlated with the personal distress item of empathy in the Interpersonal Reactivity Index-IRI (Giummarra et al., 2015).

'Short Form of Perfectionism Scale' is a shortened version of 'Almost Perfect Scale-Revised' and measure two essential properties of perfectionism: high performance expectations, self-critical attitudes associated with performance evaluation. 'Short Form of Perfectionism Scale' has 8 items rated on a scale ranging from 1 to 7 points (1 = strongly disagree; 7= strongly agree). The items were: (1) I have high expectations for myself; (2) I set very high standards for myself; (3) I expect the best from myself; (4) I have a strong need to strive for excellence; (5) Doing my best never seems to be enough; (6) My performance rarely measures up to my

standards; (7) I am hardly ever satisfied with my performance; (8) I often feel disappointment after completing a task because I know I could have done better (Rice et al., 2014). The validity was ensured by a pilot study which was conducted with 10 migraineurs on 8-12 February 2021. Cronbach alpha coefficient of the ‘Empathy for Pain Scale’ was 0.948 and the Cronbach's alpha coefficient of the ‘Short Form of Perfectionism Scale’ was 0.716. These values show that the reliability of the items is high (Yıldız and Uzunsakal, 2018).

RESULTS

The total empathy score of the migraineurs was high than that of control group (135.65±35.51) (146.76±41.28) (P<0.05). The total perfectionism score of the migraineurs (33.56±8.50) was not statistically different from the control group (35.69±7.9) (P>0,05).

Table 1. The empathy scores and the perfectionism scores of the groups. Mann-Whithney U test, N=104.

	Groups	Mean	Min	Max	SD	SEM	P
Total Empathy Score	MG	146.76	49	218	41.28	4.05	0.039*
	C	135.65	57	220	35.51	3.48	
Total Perfectionism Score	MG	33.56	10	52	8.50	0.83	0.062
	C	35.69	19	55	7.9	0.78	

MG: Migraine C: Control * p < 0.05.

Compared to the control group disgust (9.13±4.328) (10.73±4.503) and avoidance (8.68±4.672) (10.13±5.116) items of the ‘Empathy for Pain Scale’ which are subitems of affective distress were significantly higher in migraineurs (P<0.05). The subitems of vicarious sensations (8.19±4.607) (9.58±5.1) (P<0.05) and vicarious pain (7.30±4.371) (9.30±5.051) (P<0.005) were statisticly high in migraineurs.

Table 2. ‘Empathy for Pain Scale’ expressions of the groups. Mann-Whitney U test, * p < 0.05; ** p < 0.005.

Empathy for Pain Scale Expressions	Groups	Mean	SD	SEM	P
Distress	M	14.83	4.379	.429	0.139
	C	14.03	3.296	.323	
Discomfort	M	14.05	4.418	.433	0.158
	C	13.24	3.769	.370	
Disgust	M	10.73	4.503	.442	0.009*
	C	9.13	4.328	.424	
State Empathy	M	15.00	4.304	.422	0.590
	C	14.70	3.628	.356	
Visceral Sensations	M	9.22	4.723	.463	0.045*
	C	7.96	4.288	.420	
Restless	M	10.64	4.719	.463	0.064
	C	9.46	4.452	.437	
Fear	M	11.02	4.857	.476	0.046*
	C	9.71	4.534	.445	
Avoidance	M	10.13	5.116	.502	0.035*
	C	8.68	4.672	.458	
Compassion	M	15.97	4.518	.443	0.234
	C	16.63	3.419	.335	
Need to help	M	16.30	4.371	.429	0.558
	C	16.62	3.357	.329	
Vicarious sensations	M	9.58	5.100	.500	0.041*
	C	8.19	4.607	.452	
Vicarious pain	M	9.30	5.051	.495	0.003**
	C	7.30	4.371	.429	

There was no statistically significant difference in terms of the empathy scores between the migraineurs with aura (141.20±48.11) and without aura (150.24±36.35) ($p>0.05$). The perfectionism score of the migraineurs with aura (33.88±9.19) was not different from the migraineurs without aura (33.36± 8.11) ($p>0,05$).

The empathy level was high in woman migraineurs (130.09±40.59) (150.98±40.61) ($p<0,05$). Although there was a significant difference in attack duration according to marital status, there was no difference between two groups according to the Bonferoni-correction ($p>0.01$). Empathy was high in those who do not have a child/children (138.42±42.71) (160.67±35.04) ($p<0.05$). The frequency of attacks in the last 6 months was higher in those who have not a family history of migraine (28.14±23.12) (42.96±36.04) ($p<0.05$). It was determined that the frequency of attacks in last 6 months was significantly high (30.54±28.29) (47.70±34.88) and total empathy score was significantly low (153.79±38.48) (131.64±43.58) in cigarette user migraineurs ($p<0.05$). The number of attacks in the last 6 months (29.05±31.33) (44.38±29.653) and the total empathy level (139.12±4.28) (156.02±40.99) was high in those receiving prophylactic treatment ($p<0.05$).

Table 3. The empathy scores and the perfectionism scores of the migraineurs with aura and without aura. T- test.

	<i>Migraine</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>SEM</i>	<i>P</i>
<i>Total Empathy Score</i>	<i>With Aura</i>	40	141.2	48.11	7.61	0.28
	<i>Without Aura</i>	64	150.24	36.35	4.54	
<i>Total Perfectionism Score</i>	<i>With Aura</i>	40	33.88	9.19	1.45	0.765
	<i>Without Aura</i>	64	33.36	8.11	1.01	

Table 4. The comparison of patients’ characteristics and the frequency of attacks in the last 6 months, the duration of attacks, the empathy scores, the perfectionism scores. T- test, * p <0.05.

		Number of Attacks in the Last 6 Months		Attack Duration (hour)		Total Empathy Score		Total Perfectionism Score	
		Mean	p	Mean	p	Mean	p	Mean	p
Gender	Women	38.17 31.94	0.159	27.13 26.69	0.129	150.98 40.61	0.038*	33.77 8.48	0.613
	Men	27.33 28.15		17.81 15.74		130.09 40.59		32.72 8.76	
Age	Below 40	38.31 30.16	0.259	22.69 22.05	0.120	149.96 39.52	0.238	33.38 8.64	0.744
	Above 40	30.75 33.90		31 30.48		139.56 44.80		33.97 8.31	
BMI	Normal	38.54 33.85	0.506	23.39 18.82	0.545	154.90 40.25	0.105	34.24 8.87	0.509
	Abnormal	34.32 29.84		26.46 28.52		141.46 41.39		33.11 8.29	
Marital Status	Single	34.50 25.36	0.396	15.91 17.02	0.033*	158.94 32.77	0.056	33.53 8.9	0.328
	Engaged	12		8		120		46	
	Married	35.55 32.92		31.25 27.84		141.81 43.53		32.97 8.4	
	Divorced	60.8 45.53		20.4 11.7		118.6 40.54		35.4 6.27	
	Her/his wife/husband passed away	23.5 30.41		3.5 0.71		194 28.29		42 7.071	
Child	Yes	37.05 35.12	0.657	28.26 26.4	0.114	138.42 42.71	0.007*	33.12 7.97	0.504
	No	34.21 24.25		20.23 22.15		160.67 35.04		34.28 9.39	
Cigarette	Yes	47.7 34.88	0.009*	25.58 21.2	0.929	131.64 43.58	0.010*	35.49 7.76	0.115
	No	30.54 28.29		25.1 26.84		153.79 38.48		32.66 8.74	
Alcohol	Yes	42.2 44.28	0.652	15.8 18.5	0.391	146.4 44.21	0.984	35.2 5.45	0.660
	No	35.67 30.88		25.73 25.35		146.78 41.36		33.48 8.64	
Family History	Yes	28.14 23.12	0.015*	26.27 25.49	0.699	144.43 46.7	0.589	33.51 8.27	0.957
	No	42.96 36.04		24.35 24.92		148.84 36.08		33.6 8.78	
Chronic Disease	Yes	39.34 28.41	0.410	27.37 29.72	0.516	152.5 42.82	0.284	31.5 9.43	0.061
	No	34.05 33.03		24.03 22.15		143.46 40.32		34.74 7.75	
Prophylactic Treatment	Yes	44.38 29.65	0.012*	22.4 24.62	0.296	156.02 40.99	0.037*	33.89 9.47	0.716
	No	29.05 31.33		27.6 25.45		139.12 40.28		33.28 7.69	
Duration of Prophylactic Drug Medication	≤1 month	39.25 28.03	0.958	22.58 25.49	0.403	139.92 38.67	0.452	33.5 9.42	0.913
	>1-≤ 6 months	45.1 28.9		25.52 23.84		161.67 44.68		34.05 9.23	
	>6-≤ 12 months	40.43 37.3		8.57 6.97		160 39.43		35.86 6.44	
	>12 months	42.25 36.12		20 23.53		144.75 34.67		35.75 8.99	
Multiple analgesic	Yes	41.49 35.64	0.111	25.75 26.95	0.336	142.4 42.28	0.151	33.65 8.76	0.743
	No	30.38 23.96		20.47 21.96		155.41 39.9		33.03 8.63	

DISCUSSION

Although pain is a manifestation, migraine is a result of sensory processing disorder effecting central nervous system with projections (Goadsby and Holland, 2019). The insular cortex has an important role for interoceptive awareness (Seth et al., 2011). Insular cortex function is also associated with pain (Wager et al., 2004), general emotional processing (Zaki et al., 2012), cognitive control (Seth et al., 2011), trust (King-Casas et al., 2008) and empathy (Gu et al., 2013a). Anterior insular cortex neurons extends to the hypothalamus through the amygdala. In this manner, anterior insular cortex can cause physiological responses in the body (Gu et al., 2013b). The diencephalic changes and also the altered brainstem function have been reported in migraineurs. These changes in pain related regions have a critic role in initiation and maintenance of migraine (Mungoven et al., 2021). It has been reported that chronic migraineurs have stronger activation of the anterior hypothalamus during trigeminal stimulation with visual stimuli compared to controls (Schulte et al. 2018). It also has been concluded that thalamo-insular network has a role within the neuronal circuit of the migraine (Younis et al., 2019) and the bilateral connectivity changes of the thalamus within a thalamo-insular network has been showed during migraine attacks (Stankewitz and Schulz, 2022). Almost every stimulus that reaches the cortex, first extends to the thalamus and the thalamus is connected to the limbic networks (LaBerge, 1997). As a result, psychosocial status has directly effect on more vulnerable migraineurs (Cerami et al., 2021). However, cerami et al. (2021) did not find any significant difference between the migraneurs and the control group according to empathic abilities during the Covid-19 lockdown. Meanwhile, empathy levels of the whole population differs because of anxiety and death risk during the crisis of the Covid-19 lockdown (Grignoli et al., 2021).

Empathy involves cognitive component (Blair, 2005) and affective component which acts for empathizing the emotion of people through empathic concern and/or

vicarious sensations (Reniers et al., 2011). Affective empathy and cognitive empathy are overlapping concepts (Mackes et al., 2018). Vicarious pain means feeling pain when seeing another person in pain (Giummarra et al., 2015). However, the prior experience has a role in responding empathically to another persons' pain (Preis and Kroener-Herwig, 2012). Probably for this reason, we found high levels of vicarious sensations ($p < 0.05$) and vicarious pain ($p < 0.005$) in migraineurs who suffer from pain during attacks. However, feeling vicarious pain can cause avoiding other people (Bernhardt and Singer, 2012). We found not only high levels of avoidance ($p < 0.05$) in migraineurs but also high levels of disgust via 'Empathy for Pain Scale' ($p < 0.05$). Seeing others suffer reduces pain threshold (Morrison et al., 2012). Probably, migraineurs disgust of others' pain because of increased vicarious sensations and vicarious pain properties of empathy. Moreover, some migraineurs with perfectionism have the fear of pain and this contribute to medication overuse (Curone et al., 2014). Perfectionism is a risk factor for depression, social anxiety and many mental health conditions (Wright et al., 2020). In the current study, the total perfectionism score in migraineurs was not statistically different from the control group ($p > 0.05$). It had been stated that migraineurs tend to be perfectionistic and they had elevated scores of Body Dissatisfaction (Brewerton and George, 1993). However, in the current study according to Body Mass Index (BMI), there was no significant difference between the control group and the migraine group ($p > 0.05$). It also has been reported that several physical tests performance are reduced in migraineurs (Anarte-Lazo et al., 2021). In this point of view, may be migraineurs want to catch the high perfectionism scores of the society.

Although higher empathy scores were obtained in migraineurs compared to the control group, we found that female migraineurs had higher total empathy scores compared to male migraineurs ($p < 0.05$). This is similar to the fact that the empathy scores are higher in women compared to men in normal populations (Depow et al., 2021).

Although migraine generally starts during puberty, people who suffer from this disease are mostly between the ages of 35-45 (Stovner et al., 2007). During the initiation of the attacks, the common characteristic symptoms are concentration difficulty, fatigue, photophobia and neck stiffness (Giffin et al., 2003). The increased oxidative stress had been shown in migraineurs. The migraineurs malondialdehyde (MDA) levels are higher than in the control group (Tuncel et al., 2008). Cigarette increases the inflammatory cytokine production (Chi et al., 2012). Increased inflammation and oxidative stress inhibits neurotransmitter signaling because increased inflammatory cytokines disrupt synaptic plasticity by disrupting neurotransmitter metabolism (Sarwar et al., 2022). Normally, serotonin receptor stimulation decreases oxidative stress, increases brain plasticity, cognitive flexibility and also empathy (Strumila et al., 2021). Maybe relatively higher oxidative stress and decreased serotonin signaling are related to decreased empathy and higher frequency of attacks in last 6 months in cigarette user migraineurs ($p < 0.05$). The high frequency of attacks in the last 6 months in those without a family history of migraine also draws attention to the importance of possible environmental stress factors in the pathophysiology of migraine ($p < 0.05$).

It has been concluded that increased workload causes increased oxidative stress and decreased antioxidant capacity (Buyukhatipoglu et al., 2010). Due to the life conditions of childless migraineurs, they may have lower workload. As a result of relatively lower and tolerable oxidative stress in childless individuals, they may have higher empathy scores compared to migraineurs with a child/children ($p < 0.05$).

The number of attacks in the last 6 months was high in those receiving prophylactic treatment ($p < 0.05$). There are also cases in which prophylactic treatment is not effective in reducing the number of attacks in migraineurs (Xu et al., 2020). The total empathy score was found significantly high in migraineurs receiving prophylactic treatment ($p < 0.05$).

After prophylactic treatment with paracetamol empathy scores are higher in tension-type headache patients (Cankaya et al., 2020). Probably, after pain relief during prophylactic treatment empathy scores of the migraineurs increased. Since some patients were prescribed different groups of drugs, the number of attacks in the last 6 months, duration of attacks (hour), total empathy scores and total perfectionism scores could not be compared according to a certain prescribed drug.

Author Contributions

The authors made significant contributions to this research, as indicated in the order.

Plan, design: Acar MD, Polat M, Tural E, Terzi M.

Material, methods and data collection: Acar MD, Polat M, Tural E, Can Usta N, Dogan B.

Data analysis and comments: Acar MD, Polat M, Tural E.

Writing and corrections: Acar MD.

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