



# Pain, health literacy, and related factors in patients with migraine

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## Abstract

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**Aim:** Migraine affects activities of daily living by decreasing individuals' productivity and therefore imposes an economic burden on societies. In our study, considering health literacy's (HL) close relationship with self-management, hospitalization rates, and health care costs, we aimed to determine the HL of patients with migraine and the relationship between demographic, clinical, and social factors affecting it.

**Materials and Methods:** The sample included 211 patients at least 18 years old who applied to the neurology outpatient clinic between July and December 2023 and had been diagnosed with migraine for at least 6 months. Data were collected using a sociodemographic information form regarding clinical features, the Visual Analog Scale (VAS), and the Health Literacy Scale (HLS-14) with established validity and reliability.

**Results:** On average, patients were 34.24 years old (SD = 12.23) and scored 47.54 points (SD = 12.60) on the HLS-14 and 7.53 points (SD = 1.88) on the VAS. Statistically significant ( $p \leq .05$ ) differences emerged between the patients in terms of age, marital status, level of education, income, disease duration, and HLS-14 scores, along with a negative correlation between VAS and HLS-14 scores ( $r = -.140$ ,  $p = .042$ ).

**Conclusion:** For individuals to participate more actively in making decisions about their health and benefit from better-quality health services, their HL has to be increased. Health care professionals should therefore identify patient groups with historically low HL and provide especially accessible information to such patients.



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## Introduction

Headache disorders rank among the most common neurological conditions in humans. Of them, migraine, the second-leading cause of disability worldwide [1], significantly affects individuals' daily and social activities as well as reduces the quality of life [2, 3]. Appropriate treatments can reduce migraine's burden on patients by improving their activities of daily living and thereby reduce the economic burden caused by their decreased productivity [4].

The ability to understand medical instructions has been the subject of extensive research, which has, in turn, given rise to the concept of health literacy (HL), defined as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services necessary to make appropriate health decisions" [5]. Research on HL has established a link between HL and knowledge of chronic diseases such as diabetes [6], hyper-

tension [7], and asthma [8]. A large systematic review has also revealed that low HL is common and consistently associated with level of education, ethnicity, and age [9]. To optimize patient care and reduce the medical and financial burden of hospitalization, physicians need to ensure that patients understand the indications, dosages, and adverse effects of prescription medications [10]. Impeding that goal, low HL is associated with poorer self-management, higher hospitalization rates, health care costs, and even mortality [11, 12].

Considering the high prevalence of migraine in patients who present at neurology clinics, it is pivotal for physicians to recognize low HL in their patients and take steps to overcome it. To aid that effort, in our study we sought to determine the HL of patients with migraine and the relationship between the demographic, clinical, and social factors affecting it.

## Materials and Methods

The study received ethics approval from the Harran University Non-Interventional Clinical Research Ethics Com-

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mittee (HRU/23.12.14), and the necessary institutional permission was obtained from the hospital where the study was conducted. Permission to use the scales was obtained from the researchers who validated the Turkish versions of the scales used in the study. Patients who agreed to participate in the study were informed about the study and that their participation was voluntary, and their written consent was obtained.

#### *Research design and sample*

In a cross-sectional descriptive study designed to determine pain, HL, and related factors in patients with migraine, we formed a sample of patients diagnosed with migraine who applied to Harran University Neurology Polyclinic. The sample size was calculated as a minimum of 211 with a 5% deviation and 95% confidence level using the information that the prevalence of migraine is 16.7%. To participate, patients had to (1) be more than 18 years old, (2) have applied to Harran University Faculty of Medicine Neurology Polyclinic between July and December 2023, (3) have been diagnosed with migraine for at least 6 months and (4) should have no comorbidities.

#### *Data collection tools*

To collect data, we used a sociodemographic information form, the VAS, and a Turkish version of the Health Literacy Scale (HLS-14). Data were collected in face-to-face interviews each lasting approximately 10 min.

#### *Sociodemographic information form*

The sociodemographic information form consisted of 15 items concerning participants' age, sex, income level, occupation, marital status, level of education, way of accessing health-related information, disease duration, family history of migraine, and use of any treatments for migraine.

#### *Health Literacy Scale (HLS-14)*

The HLS was developed by Suka et al. (2013) in Japan to measure adults' HL [13]. The validity and reliability of the Turkish version of the scale have been established by Türkoğlu and Kılıç (2021) [14]. The scale has three subscales: Functional Health Literacy (i.e., 5 items), Interactive Health Literacy (i.e., 5 items), and Critical Health Literacy (i.e., 4 items). Each item is rated on a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree), for total scores of 14–70 points, with higher scores meaning higher HL. Cronbach's alpha for the original scale was .85 and in our study was .89.

#### *Visual Analog Scale (VAS)*

The VAS, used to determine the severity of patients' pain, is a 10 cm line scaled from 1 (minimum pain) to 10 (maximum pain). Patients are asked to mark a place on the scale to represent the pain that they feel. That the scale does not have a language, is safe, and is easily administered have made it a widely used measure accepted around the world.

#### *Statistical analysis*

The data were analyzed using IBM SPSS Statistics (Version 22.0). Normal distribution graphs, skewness and kurtosis coefficient values were analyzed together and it was determined that the data fit the normal distribution. Descriptive statistics (number, percentage, mean values), independent samples t-test, One-way ANOVA test, and multiple comparison tests (Tukey test) were used for the measurable variables. Pearson correlation analysis was used to find the degree and direction of the relationship between the variables and linear regression model was applied. In statistical decisions,  $p < 0.05$  was accepted as an indicator of significant difference.

#### **Results**

Of the 211 patients who had been diagnosed with migraine for at least 6 months, 64.9% were female, and 35.1% were male. Their average age was 34.24 years (SD = 12.23), and their average disease duration was 5.76 years (SD = 6.27). Related to HL, 49.3% of participants reporting accessing health-related information from medical personnel, 44.1% from written and visual media and the internet, and 36.5% from relatives and friends. The participants' sociodemographic characteristics are detailed in Table 1.

As for scores on the scales, on average participants scored 47.54 points (SD = 12.60) on the HLS-14 overall and 7.53 (SD = 1.88) on the VAS. Regarding the HLS-14's three subscales, they scored 16.06 (SD = 6.55) on the Functional Health Literacy subscale, 17.26 (SD = 5.59) on the Interactive Health Literacy subscale, and 14.21 (SD = 4.23) on the Critical Health Literacy subscale, all on average (Table 2).

Statistically significant differences arose between the participants in terms of age, marital status, level of education, income level, disease duration, and HLS-14 score. Although the mean HL scores of participants older than 35 years, who were married, who were uneducated or primary school graduates, whose income was less than their expenses, and whose disease duration exceeded 5 years were significantly lower than other participants ( $p < .05$ ), their VAS scores were significantly higher ( $p < .05$ ) except age, as detailed in Table 3. Health literacy was significantly higher ( $p = 0.001$ ) and VAS score was significantly lower ( $p = 0.007$ ) in high school and university graduates compared to who were uneducated and primary school graduates. At the same time, while health literacy was significantly higher in university graduates compared to high school graduates ( $p = 0.001$ ), no significant difference was found in VAS score. Health literacy was significantly higher in the group with income equal to expense compared to the group with income less than expenses ( $p = 0.017$ ), while VAS score was significantly lower ( $p = 0.001$ ) (Table 3).

There is a negative, low level significant relationship between the health literacy variable and the visual pain scale ( $R = -.140$ ,  $R^2 = .020$ ,  $p = 0.042$ ). According to the standardized regression coefficients ( $\beta$ ), a one unit increase in health literacy level leads to a 14% decrease in pain score. When the t-test results regarding the significance of the regression coefficients were analyzed, it was found

**Table 1.** Sociodemographic characteristics of the participants.

Variables		Participants n (%)
Gender	Female	137 (64.9)
	Male	74 (35.1)
Age/year	18-35	135 (64)
	36-78	76 (36)
Marital Status	Married	109 (51.7)
	Single	88 (41.7)
	Other	14 (6.6)
Education	Did not go to school	46 (21.8)
	Primary education	46 (21.8)
	High school	52 (24.6)
	University	67 (31.8)
Profession	Housewife	94 (44.5)
	Workers-Tradesmen	40 (19.0)
	Civil servant	45 (21.3)
	Retired	3 (1.4)
	Agricultural worker	9 (4.3)
	Student	20 (9.5)
Income status	Income less than expenses	90 (42.7)
	Income equal to expenses	78 (37.0)
	Income exceeds expenses	43 (20.3)
How do you access health-related information?	Written and visual media, via the internet	93 (44.1)
	Through health personnel	104 (49.3)
	Relative or friend recommendation	77 (36.5)
Disease duration/year	1-5	144 (68.2)
	6-35	67 (31.8)
Family history of migraine	Yes	125 (59.2)
	No	86 (40.8)
Have you used any other treatment method before?	Yes	62 (29.4)
	No	149 (70.6)
If so, which method did you use?	Medicine	44 (20.9)
	Cupping	5 (2.4)
	Botox	7 (3.3)
	Acupuncture	7 (3.3)
Do you experience sensory disturbances called aura?	Yes	63 (29.9)
	No	148 (70.1)
Do you use prescription medications that may work in the short term to relieve migraine symptoms?	Yes	167 (79.1)
	No	44 (20.9)
Do you take prescription medications that can help reduce or prevent migraine attacks from occurring?	Yes	167 (79.1)
	No	44 (20.9)

**Table 2.** Participants' Average Health Literacy Scale (HLS-14) and Visual Pain Scale (VAS) Scores.

	Possible Points (Min-Max)	Points Received (Min-Max)	Average	Standard Deviation
Functional Health Literacy	5-25	5-25	16.06	6.55
Interactive Health Literacy	5-25	5-25	17.26	5.59
Critical Health Literacy	4-20	4-20	14.21	4.23
Total HLS-14 score	14-70	18-70	47.54	12.60
Visual Pain Scale	1-10	1-10	7.53	1.88

HLS-14: Health Literacy Scale, min: minimum, max: maximum.

**Table 3.** Comparison of Participants' Sociodemographic Characteristics and Visual Pain Scale (VAS) and Health Literacy Scale (HLS-14) Average Score.

Variables		HLS-14	VAS
Gender	Female	47.47(12.86)	7.78(1.09)
	Male	47.70(12.20)	7.06(1.41)
	p*	0.89	<b>0.008</b>
Age/year	18-35	50.11(12.29)	7.35(1.96)
	36-78	42.96(11.90)	7.85(1.70)
	p*	<b>0.001</b>	0.065
Marital Status	Married	45.52(12.78)	7.88(1.66)
	Single/Other	49.69(12.10)	7.15(2.03)
	p*	<b>0.016</b>	<b>0.005</b>
Education	Did not go to school	40.97(11.52)	8.00(1.77)
	Primary education	42.45(10.67)	8.08(1.69)
	High school	49.05(11.60)	7.09(1.76)
	University	54.32(11.68)	7.17(2.04)
	p*	<b>0.001</b>	<b>0.007</b>
Income	Income less than expenses	44.78(12.05)	7.98(1.63)
	Income equal to expenses	50.24(12.24)	6.93(2.09)
	Income exceeds expenses	48.39(13.46)	7.67(1.72)
	p*	<b>0.017</b>	<b>0.001</b>
Disease duration (in years)	1-5	49.16(12.34)	7.23(1.98)
	6-35	44.04(12.53)	8.17(1.46)
	p*	<b>0.006</b>	<b>0.001</b>
Family history of migraine	Yes	48.65(12.46)	7.83(1.67)
	No	45.91(12.69)	7.10(2.09)
	p*	0.121	<b>0.006</b>
Have you used any other treatment method before?	Yes	48.43(12.06)	8.01(1.60)
	No	47.14(12.85)	7.32(1.96)
	p*	0.49	<b>0.014</b>
Do you experience sensory disturbances called aura?	Yes	49.25(12.14)	8.01(1.72)
	No	46.81(12.76)	7.33(1.92)
	p*	0.198	<b>0.016</b>
Do you use prescription medications that may work in the short term to relieve migraine symptoms?	Yes	47.01(12.91)	7.91(1.65)
	No	49.54(11.28)	6.11(2.04)
	p*	0.236	<b>0.001</b>
Do you take prescription medications that can help reduce or prevent migraine attacks from occurring?	Yes	47.23(12.72)	7.80(1.66)
	No	48.70(12.22)	6.52(2.30)
	p*	0.492	<b>0.001</b>

\* Independent Samples T-test, \*\* One-Way ANOVA Post Hoc Tests: Tukey's test.

that health literacy had a significant and negative effect on the pain score.

## Discussion

Increased recognition of the personal, social, and economic burdens attributable to migraine has prompted the Global Burden of Disease to identify migraine as the third-most common disease in the world [15]. Moreover, headaches are recognized as some of the most disabling conditions worldwide [16]. However, only a small proportion of patients with headaches receive adequate preventive treatment, and migraine in particular remains an underdiagnosed, undertreated, misunderstood disease [17]. Although the literature examining HL's effect on migraine is thin, patient-

related barriers, including low HL, may hinder the optimal management of migraine. Because pain is a unique individual experience, optimal treatment is achieved only by physicians using treatments tailored to individual patients. In turn, such personalized treatment programs can succeed only if patients are skilled at self-management, which is an essential element in pain management [18] and requires adequate HL to be effective [19]. In a study conducted to determine why patients with chronic pain or migraine do not seek treatment, the chief reason for patients with migraine was that they tend to self-medicate to manage their pain and therefore do not seek treatment in medical institutions [20]. In our study, 49.3% of participants re-

ported accessing health-related information from medical personnel and 44.1% from written and visual media and the internet. Considering the rural region where the study was conducted, social stigma and privacy concerns may discourage individuals from accessing health care services [21]. Such individuals are also likely to face transportation-related barriers, for the average travel time and distance for patients in rural communities is longer than in urban communities [21]. The fact that health professionals, who are the first and most reliable sources for health-related information, do not have enough time to provide health education ultimately leads individuals to other, largely unreliable sources such as the internet, television, and newspapers [22]. In their research, Tekin et al. [23] determined that the health-related information obtained online was highly influential in the health-related decisions of 30.4% of the participants. Russo et al., in their evaluation of the readability of the homepages of the top 10 headache and migraine focused websites identified by Google, found that readability was low, meaning that at least a university level was required to understand the contents [24]. The failure to meet the need for clear, accurate information from headache- and migraine-focused websites may lead to the underdiagnosis and inadequate treatment of migraine [25, 26]. Among our results, 36.5% of participants in our study reported accessing health-related information from relatives and friends. Considering that 79.1% of participants reported migraine attacks and receiving prophylactic treatment, the issue of overmedication for headaches, which can occur after the continuous use of medications, including over-the-counter medications, and worsen the pain, should also be taken into consideration [27, 28]. Patients with low HL have poorer knowledge about painkillers, which may contribute to the misuse of those agents [29]. The ability to understand medical instructions has been the subject of extensive research that has guided the conceptualization of HL [30]. In a study investigating the prevalence of HL in a cohort of adult neurological patients, 20.5% of patients had low HL [30]. In another study, by contrast, roughly 50% of adults across various disease groups had low HL [9]. Studies using a variety of validated tools have additionally identified low HL in 35% to 85% of individuals at least 65 years old [31, 32]. In our study, patients with migraine had a medium level of HL, with a mean total HLS-14 score of 47.54 points (i.e., in a total range of 14–70 points). Of the demographic characteristics shown to affect HL, age was a determining factor. A young age has indeed been pinpointed as a reason for not seeking treatment [20], and studies conducted among groups with sufficient and limited HL have shown that the rate of HL decreases with age [3, 20]. Consistent with published reports on age and pain severity [33, 34], we additionally found that patients with migraine at least 35 years old had significantly lower HL and higher VAS scores. HL also decreases with age but increases as level of education increases [22]. In a multivariable regression model evaluating demographic and clinical factors of HL, lower HL was found to be associated with lower education and longer disease duration [30]. In our study, HL was significantly lower and VAS scores were significantly higher in patients who were primary school graduates or

had never attended school and whose disease had lasted more than 5 years. Studies have revealed a relationship between socioeconomic status and high HL [35, 36]. Consistent with the literature, in our study HL was significantly lower and VAS was significantly higher in the low-income group. Also in our study, a negative correlation emerged between severity of pain and HL. According to standardized regression coefficients, a one-unit increase in HL coincided with a 14% decrease in VAS score. Although that result is compatible with corroborates the results of Thorn et al. [37], Devraj et al. found no direct relationship between VAS score and HL [29]. Those mixed results may have stemmed from differences in how HL and severity of pain were measured. Our study was conducted with a limited sample, and its findings have limited generalizability due to being hospital-based instead of community-based and being cross-sectional.

## Conclusion

In conclusion, insufficient HL can cause the underuse of preventive health care services, noncompliance with recommended treatments, delays in health-seeking behavior during the symptomatic period, and increases in health costs and mortality. To communicate better with health professionals, participate more actively in making health-related decisions, and benefit from better-quality health care services, individuals need improved HL. Health care professionals should also not only improve their knowledge about HL but also identify patient groups with historically low HL and provide especially accessible information to them.

## Ethical approval

This study received ethics approval from the Harran University Non-Interventional Clinical Research Ethics Committee (HRU/23.12.14).

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