

# Translation and Validation of the Turkish Version of the Vestibular Migraine Patient Assessment Tool and Handicap Inventory

## Vestibüler Migren Hasta Değerlendirme Aracı ve Engellilik Envanterinin Türkçe Versiyonunun Çevirisi ve Doğrulaması

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**ABSTRACT Objective:** The Vestibular Migraine Patient Assessment Tool and Handicap Inventory (VM-PATHI) is a newly introduced clinical questionnaire. This study aimed to translate the VM-PATHI into Turkish, adapt it cross-culturally, and validate it. **Material and Methods:** The study was carried out with 50 patients with VM and 49 controls. The questionnaire was administered to patients and healthy volunteers through face-to-face interviews. They were asked to fill out the VM-PATHI questionnaire, as well as accomplish the Dizziness Handicap Inventory, the Short Form-36 and the Depression Anxiety Stress Scale. **Results:** The Cronbach's alpha coefficient of the VM-PATHI questionnaire was 0.95, which indicated internal consistency. For test-retest reliability, VM-PATHI was applied to the same sample at 3-week intervals and the correlation between the results was examined. According to this result, the correlation coefficient between the 2 applications is 0.79 ( $p < 0.001$ ), indicating that VM-PATHI provides stable measurements over time. **Conclusion:** Our study found that the Turkish VM-PATHI questionnaire, which is used to assess vestibular migraine, had high internal consistency, test-retest reliability, and validity.

**ÖZET Amaç:** Vestibüler Migren Hasta Değerlendirme Aracı ve Engellilik Envanteri [Vestibular Migraine Patient Assessment Tool and Handicap Inventory (VM-PATHI)] klinik olarak yeni tanımlanmış bir anketir. Bu çalışmada, VM-PATHI'nın Türkçeye çevrilmesi, kültürler arası uyulanması ve geçerliliğinin sağlanması amaçlandı. **Gereç ve Yöntemler:** Bu çalışma, 50 VM'li hasta ve 49 kontrolün katılımıyla gerçekleştirilmiştir. Anket, hastalar ve sağlıklı gönüllülerle yüz yüze görüşme yoluyla uygulandı. Hastalardan ve sağlıklı kontrollerden VM-PATHI anketinin yanı sıra Baş Dönmesi Engellilik Envanteri, Kısa Form 36 ve Depresyon Anksiyete Stres Ölçeğini doldurmaları istendi. **Bulgular:** Ölçeğin iç güvenilirliğini gösteren Cronbach alfa katsayısı 0,95 olarak hesaplanmıştır. Test-tekrar test güvenilirliği için aynı örneklemle 3 hafta arayla VM-PATHI uygulandı ve sonuçlar arasındaki korelasyon incelendi. Bu sonuca göre 2 uygulama arasındaki korelasyon katsayısının 0,79 ( $p < 0,001$ ) olması VM-PATHI'nın zaman içinde stabil ölçümler sağladığını göstermektedir. **Sonuç:** Çalışmamız, VM'yi değerlendirmek için kullanılan Türkçe VM-PATHI anketinin yüksek iç tutarlılığa, test-tekrar test güvenilirliğine ve geçerliliğine sahip olduğunu desteklemektedir.

**Keywords:** Migraine; vertigo; headache

**Anahtar Kelimeler:** Migren; vertigo; baş ağrısı

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Vestibular migraine (VM) is frequently attributed as one of the leading causes of recurrent vertigo.<sup>1</sup> It presents with spontaneous or positional vertigo, intolerance to head movement, visually induced dizziness, and nausea. VM is reported in 10%-20% of patients presenting to headache clinics.<sup>2</sup> Formeister et al. reported a 2.7% annual VM prevalence in the patients in their study.<sup>3</sup> The prevalence of migraine in patients with recurrent vertigo of an unknown cause varies between 60% and 80%.<sup>4</sup> VM significantly affects individuals' quality of life, hindering their ability to perform daily activities and work. The Vestibular Migraine Patient Assessment Tool and Handicap Inventory (VM-PATHI) is the first questionnaire to assess the quality of life of patients diagnosed with VM.<sup>5</sup> In this study, we conducted the translation and validation of the VM-PATHI into Turkish.

## MATERIAL AND METHODS

### PATIENTS

#### Inclusion Criteria

- Newly diagnosed patients with definite VM according to the International Classification of Headache Disorders, 3<sup>rd</sup> edition, Appendix (beta version).<sup>6</sup>
- Patients who provided signed informed consent
- Patients who completed all questionnaires
- Patients over 18 years old.

#### Exclusion Criteria

- Patients who previously received treatment for vestibular symptoms (Benign paroxysmal positional vertigo, Meniere disease).  
Patients with postconcussive VM were also excluded.  
Patients using medications (e.g., propranolol, antidepressants, and anxiolytics) or undergoing vestibular rehabilitation that may affect their symptoms
- Patients who refused to sign the informed consent form

- Patients with incomplete responses in one or more questionnaires.

Patient records between April 2020 and March 2021 were examined prospectively. The research was approved by the Prof. Dr. Cemil Taşcıoğlu City Hospital Ethics Committee (12.01.2021). This study was conducted in line with the principles of the Declaration of Helsinki.

### TRANSLATION AND CROSS-CULTURAL ADAPTATION

An independent professional translation agency performed two separate translations from English to Turkish. The initial translation, VM-PATHI-Tur, v1, was combined by Turkish-speaking physicians. This version was then administered to five individuals to assess their comprehension of the questions, and minor adjustments were made based on their feedback, resulting in VM-PATHI-Tur, v2. Later, another professional translation agency translated the second version back into English. The back translation was evaluated against the original English version and modified to provide conceptual equivalence with the VM-PATHI-Tur translation (VM-PATHI-Tur, v3). A second pilot test (cognitive debriefing 2) was performed with five individuals, and no changes were observed. The final version of the questionnaire (VM-PATHI-Tur) was then administered to both patients and healthy volunteers ([Appendix 1](#)).

### VALIDATION

We administered the questionnaire through face-to-face interviews with the patients and healthy volunteers. The VM-PATHI-Tur, the Dizziness Handicap Inventory (DHI), the Short Form 36 (SF-36), and the Depression Anxiety Stress Scale were used on the VM patients and healthy volunteers who met the inclusion criteria.<sup>7-11</sup> VM-PATHI scores are certainly related to both dizziness and overall quality of life. It contains 25 questions and each question has a score from 0 to 4 points. A single assistant physician administered the questionnaires to 55 VM patients and 51 healthy volunteers. Patients diagnosed with VM were called outside of attack periods. A single assistant physician administered the questionnaires to 55 VM patients and 51 healthy volunteers. Five patients

## APPENDIX 1: Turkish Version of the Vestibular Migraine Patient Assessment Tool and Handicap Inventory (VM-PATHI).

## Vestibüler Migren Hasta Değerlendirme Aracı ve Handikap Envanteri

**Puanınızı hesaplamak için aşağıdaki anketi tamamlayınız.  
Teşekkür ederiz!**

**Lütfen aşağıdaki belirtilerin her birinin sizi nasıl etkilediğini değerlendirin:**

SEMPATOM	PROBLEM YOK	HAFIF PROBLEMLİ	ORTA PROBLEMLİ	CİDDİ PROBLEMLİ	SORUN OLABİLDİĞİNCE KÖTÜ
DENGESİZLİK					
YÜKSEK SESLERLE RAHATSIZLIK					
DÖNME HİSSİ					
PARLAK IŞIKLARDAN RAHATSIZLIK					
BAŞ DÖNMESİ					
STRES					
BAŞ VEYA VÜCUT HAREKETLERİ İLE BAŞ DÖNMESİ					
KULAK BASINCI VEYA KULAK DOLGUNLUĞU					
ALIŞVERİŞ MERKEZİ VEYA KAVŞAK GİBİ YOĞUN GÖRSEL SAHNELELERLE BAŞ DÖNMESİ					
HAREKET HASSASİYET/HAREKET HASTALIĞI					
ÇEVREDE YÜRÜRKEN ZORLANMAK					
MERDİVEN KULLANMA ZORLUĞU					
İŞ YERİNDE VERİMLİLİĞİN AZALMASI					
KONSANTRE OLMADA GÜÇLÜK					
ÜZÜNTÜ					
SOSYAL DURUMLARDAN KAÇINMA					
DÜŞME KORKUSU					
HAYATIN TEKRAR NORMAL OLMAYACAĞI KORKUSU					
BAŞ AĞRISI					
UNUTKANLIK					
MİDE BULANTISI					
KAFA BASINCI					
ANKSİYETE					
HAREKETSİZKEN HAREKET EDİYORMUŞ HİSSİ					
YORGUNLUK					

**SKOR:**

and two healthy volunteers were excluded from the study because of incomplete questionnaire responses. Three weeks later, the same individuals were sent the questionnaire electronically. However, not all participants could provide feedback because of the coronavirus disease-2019 pandemic.

## STATISTICAL ANALYSIS

Scale validity was evaluated using standard metrics, such as Cronbach's alpha, interitem correlations, item-test and item-rest correlations, and interitem covariance. Data normality was assessed using the Shapiro-Wilk test. Two-tailed t-tests were conducted to compare the VM-PATHI scores between the VM patients and the controls. Independent samples t-test and univariate linear regression were also employed for data analysis. Test-retest reliability was assessed to determine the reliability of the VM-PATHI.

## RESULTS

This study was carried out with 50 patients with VM and 49 controls. The mean ages of the patients and the controls were  $42.1 \pm 9.1$  years and  $42.5 \pm 10.3$  years, respectively. Eighty-six percent ( $n=43$ ) of the patients and 81.6% ( $n=40$ ) of the controls were women.

For those patients diagnosed with VM, their average score for the VM-PATHI was 51.1. [standard deviation (SD)=21.4]. Figure 1 shows the distribution of the scores. Table 1 presents the summary statistics for each item. The mean score was comparable between females (mean=51.9, SD=21.0,  $n=43$ ) and males (mean=46.1, SD=25.0,  $n=7$ ) (independent samples t-test,  $p<0.05$ ). A correlation was observed

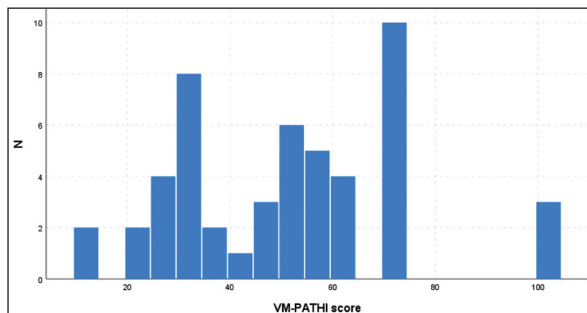


FIGURE 1: Histogram showing distribution of VM-PATHI scores for patients. VM-PATHI: Vestibular Migraine Patient Assessment Tool and Handicap Inventory.

TABLE 1: Summary statistics for each item in VM-PATHI.

Variable	Mean	SD	Minimum	Maximum
Imbalance	1.74	1.07	0	4
Phonophobia	2.32	1.10	0	4
Spinning	2.18	0.98	0	4
Photophobia	2.24	1.22	0	4
Lightheadedness	2.32	1.08	0	4
Stress	2.52	1.15	0	4
Dizziness with motion	2.02	1.19	0	4
Ear pressure	1.92	1.32	0	4
Visual vertigo	1.84	1.35	0	4
Motion sickness	1.62	1.26	0	4
Difficulty walking	1.76	1.44	0	4
Difficulty with stairs	1.88	1.36	0	4
Difficulty with work	1.76	1.44	0	4
Difficulty with concentration	1.96	1.24	0	4
Sadness	2.12	1.19	0	4
Social avoidance	1.78	1.33	0	4
Fear of falling	1.88	1.45	0	4
Fear that life won't be normal again	1.56	1.46	0	4
Headaches	2.84	0.89	0	4
Memory difficulty	2.68	1.19	0	4
Nausea	2.04	1.24	0	4
Head pressure	2.22	1.40	0	4
Anxiety	1.96	1.23	0	4
Illusory movement	1.94	1.62	0	4
Fatigue	2.34	1.04	0	4

VM-PATHI: Vestibular Migraine Patient Assessment Tool and Handicap Inventory; SD: Standard deviation.

between age and the VM-PATHI scores in univariate linear regression modeling ( $\beta=0.413$ ,  $p=0.003$ ). The Cronbach's alpha coefficient, which indicates the internal reliability of the measure, was calculated to be 0.95. The item-test and item-rest correlations for each scale item are shown in Table 2.

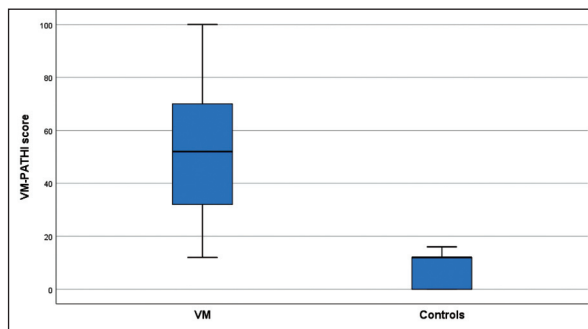
The scale was administered to 49 control patients to evaluate discriminant validity (SD=6.2). The result was compared with that of 50 patients with VM, with a mean score of 51.1 (SD=21.4). Scores were compared using a two-tailed t-test, revealing a statistically significant difference ( $p<0.001$ ). Figure 2 shows a box and a whisker plot indicating the difference in scores between the patients with VM and the controls.

The patients also completed the DHI and the SF-36 to evaluate concurrent validity. The average DHI score for the patients diagnosed with VM was 64.0

**TABLE 2:** Item test, item rest, and alpha values are displayed for each item in VM-PATHI.

Item	Item test correlation	Item rest correlation	Average interitem covariance	Alpha
Imbalance	0.563	0.529	0.493	0.952
Phonophobia	0.741	0.717	0.681	0.951
Spinning	0.667	0.629	0.555	0.952
Photophobia	0.481	0.432	0.463	0.953
Lightheadedness	0.617	0.581	0.547	0.952
Stress	0.472	0.416	0.419	0.953
Dizziness with motion	0.552	0.506	0.525	0.953
Ear pressure	0.772	0.745	0.845	0.950
Visual vertigo	0.667	0.625	0.727	0.951
Motion sickness	0.809	0.784	0.848	0.950
Difficulty walking	0.774	0.745	0.915	0.950
Difficulty with stairs	0.792	0.777	0.907	0.950
Difficulty with work	0.771	0.749	0.919	0.950
Difficulty with concentration	0.763	0.744	0.797	0.950
Sadness	0.588	0.556	0.576	0.952
Social avoidance	0.657	0.628	0.721	0.951
Fear of falling	0.826	0.809	0.999	0.949
Fear that life won't be normal again	0.716	0.689	0.862	0.951
Headaches	0.636	0.608	0.474	0.952
Memory difficulty	0.684	0.654	0.672	0.951
Nausea	0.543	0.512	0.556	0.953
Head pressure	0.718	0.687	0.828	0.951
Anxiety	0.762	0.736	0.779	0.950
Illusory movement	0.813	0.783	1.074	0.950
Fatigue	0.712	0.683	0.619	0.951

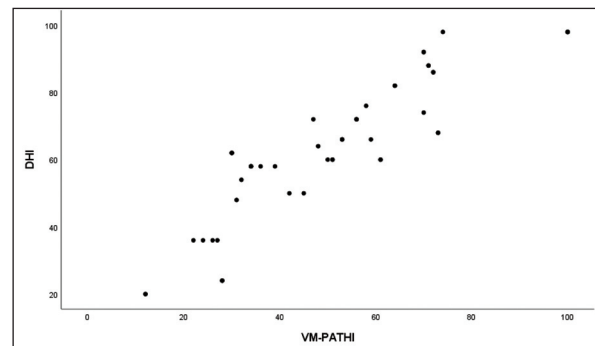
VM-PATHI: Vestibular Migraine Patient Assessment Tool and Handicap Inventory.



**FIGURE 2:** VM-PATHI score compared across cases (VM) and controls. VM-PATHI: Vestibular Migraine Patient Assessment Tool and Handicap Inventory.

(SD=20.6). The correlation coefficient of 0.89 indicates a strong positive association between the DHI and the VM-PATHI. **Figure 3** shows a scatterplot depicting the relationship between the DHI and the

VM-PATHI. A linear regression analysis used the DHI as the predictor (independent) variable and the VM-PATHI as the response (dependent) variable.



**FIGURE 3:** Scatterplot of DHI and VM-PATHI scores. VM-PATHI: Vestibular Migraine Patient Assessment Tool and Handicap Inventory; DHI: Dizziness Handicap Inventory.

The model's statistical significance was  $p < 0.0001$ , and the adjusted R-squared value was 0.79, indicating strong goodness of fit. Subscale scores were computed for each component of the SF-36, and Table 3 presents the mean scores, standard deviations, adjusted univariate R-squared values, and  $p$  values for each subscale.

In the univariate linear regression, the Depression Anxiety Stress Scale scores were significantly associated with the VM-PATHI scores ( $p < 0.0001$ , adjusted R-squared 0.59;  $p < 0.0001$ , adjusted R-squared=0.58;  $p < 0.0001$ , adjusted R-squared=0.63).

The VM-PATHI was administered for test-retest reliability with the same sample at a three-week interval, and the correlation between the results was examined. The correlation coefficient between the two administrations was 0.79 ( $p < 0.001$ ), indicating that the VM-PATHI provided stable measurements over time.

## DISCUSSION

VM is a condition characterized by dizziness accompanied by migraine symptoms, such as headache, photophobia, and phonophobia. It typically occurs in episodic attacks, and there is often no pathology found between attacks in neurological and ocular examinations. The findings during attacks are nonspecific, and positional nystagmus may be present but is usually low in amplitude.<sup>12</sup> VM can be diagnosed with a clinical presentation. Audiovestibular tests are not useful for VM diagnosis, as vestibular test results are not diagnostic of VM. However, performing tests

for other diseases that can be definitively diagnosed is recommended to rule out other possible diagnoses. Because of the lack of a definitive diagnosis for this specific clinical condition, there is a need for a supportive tool to strengthen the diagnosis, as it can be confused with other clinical conditions that cause dizziness. In this regard, the VM-PATHI may help in VM diagnosis. Various questionnaires have been developed to assess the diagnoses, treatment responses, and quality of life of patients with previous histories of vertigo (e.g., the Vertigo, Dizziness, and Imbalance Questionnaire, the Vertigo Handicap Questionnaire, and the DHI).<sup>7,13</sup> These questionnaires show respondents' significant differences in quality of life during and between vertigo episodes. In the case of VM, quality of life is more affected by the chronic nature of the disease than by episodic vertigo attacks.<sup>15</sup> This has led to the need for a specific evaluation of VM. The VM-PATHI can lead to an accurate diagnosis and appropriate treatment, thereby improving patients' quality of life.

Our study demonstrated that the Turkish VM-PATHI has high internal consistency, validity, and test-retest reliability in the evaluation of VM. In the original study, the internal consistency score of the VM-PATHI was 0.92 (Cronbach's alpha).<sup>5</sup> In our study, this value was 0.95, indicating that our study has high internal consistency. The test-retest reliability in the original study was 0.90 ( $p < 0.001$ ), and in the present research, it was also measured as 0.90, indicating that the Turkish VM-PATHI has high test-retest reliability. The validity of our study was

**TABLE 3:** SF-36 domains are shown, with mean scores, SD, adjusted univariate r-squared values, and p-values for that linear regression.

SF-36 domain	Mean Score	SD	Adjusted Univariate r-Squared with VM-PATHI	p value
Physical functioning	54.6	26.2	0.37	<0.0001
Role limitations because of physical health	30.9	32.4	0.59	<0.0001
Role limitations because of emotional health	48.5	34.6	0.45	<0.0001
Social functioning	52.5	19.5	0.46	<0.0001
Bodily pain	44.1	19.6	0.19	0.001
General health	44.7	16.4	0.50	<0.0001
Energy	40.0	20.6	0.16	0.003
Mental health	51.0	24.1	0.36	<0.0001

SF-36: Short Form; VM-PATHI: Vestibular Migraine Patient Assessment Tool and Handicap Inventory; SD: Standard deviation.

evaluated in two ways. Its discriminant validity was significant compared with that of the control group ( $p < 0.001$ ). Concurrent validity was assessed using the DHI and SF-36 questionnaires, and similar values as in the original study were obtained ( $p < 0.0001$  and  $p < 0.0001$ , respectively).

Our study has several limitations. First, the lack of effect size calculation, which reflects the numerical sensitivity value, in the statistical analysis is a limitation. We could not provide supportive data because we did not use a sensitivity-measuring tool in our study. Second, there is a need for validation studies in different languages. Validation studies that would support the data we found would be beneficial. Lastly, comparing the VM-PATHI with different quality-of-life scales and demonstrating their correlations could help enhance the validity of the questionnaire.

## CONCLUSION

Our study supports the high internal consistency, test-retest reliability, and validity of the Turkish VM-PATHI questionnaire in evaluating VM. Future research could further strengthen the generalizability

of the questionnaire by evaluating it on sample groups of different ages, genders, and demographic characteristics, making the questionnaire more widely applicable in the assessment of VM.

### Source of Finance

*During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.*

### Conflict of Interest

*No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.*

### Authorship Contributions

**Idea/Concept:** Belgin Tutar; Onur Akan; **Design:** Güler Berkiten; **Control/Supervision:** Yavuz Uyar; **Data Collection and/or Processing:** Melis Ece Arkan, Hasan Sami Bircan; **Analysis and/or Interpretation:** Cem Çelik, Ercan Kulak; **Literature Review:** Hüseyin Sarı, Ömür Biltekin Tuna; **Writing the Article:** Belgin Tutar; **Critical Review:** Onur Akan; **References and Findings:** Ercan Kulak; **Materials:** Melis Ece Arkan.

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