

Adaptation and Validation to the Spanish of the Voice Handicap Index (VHI-30) and its Shortened Version (VHI-10)

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Introduction: The Voice Handicap Index has been shown to be a valid instrument for assessing self-perceived handicap associated with dysphonia.

Objectives: To test the psychometric properties of the Spanish version of the VHI-30 (Voice Handicap Index) and its shortened version VHI-10.

Subjects and method: The original VHI-30 was translated into Spanish and was completed by 232 dysphonic patients and 38 non-dysphonic individuals. Prospective instrument validation was performed.

Results: Results showed high test-retest reliability, and high item-total correlation for both Spanish VHI-30 and VHI-10. Internal consistency demonstrated to Cronbach's alpha of .93 and .86 respectively, and a significant correlation was found between the VHI scores and the patients' self-rated dysphonic severity.

Conclusions: The present study supports the use of Spanish versions of VHI-30 and VHI-10 because of their validity and reliability.

Key words: Voice Handicap Index. Spanish version. Voice disorders.

Adaptación y validación del índice de incapacidad vocal (VHI-30) y su versión abreviada (VHI-10) al español

Introducción y objetivos: El índice de incapacidad vocal (Voice Handicap Index) es un instrumento válido para la valoración del menoscabo asociado a la disfonía que percibe el paciente. El objetivo es valorar las propiedades psicométricas de la versión castellana del VHI-30 y su versión abreviada VHI-10.

Sujetos y método: El VHI-30 original se tradujo al idioma español y lo contestaron 232 pacientes con disfonía y 38 sujetos sanos. Se realizó una validación prospectiva del instrumento.

Resultados: Se encuentra una alta fiabilidad test-retest y altas correlaciones ítem-total tanto para el VHI-30 como para el VHI-10. La coherencia interna demuestra valores alfa de Cronbach de 0,93 y 0,86 respectivamente, y se encontró una correlación significativa entre las puntuaciones del VHI y la valoración de los pacientes de la severidad de su disfonía.

Conclusiones: El presente estudio apoya el uso de las versiones en español del VHI-30 y del VHI-10 por su validez y fiabilidad.

Palabras clave: Índice de incapacidad vocal. Versión española. Trastornos de la voz.

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INTRODUCTION

The quality of life of patients is an important factor that should be quantified in many branches of medicine, which is why more and more attention is being paid to developing valid tools to measure the impact of their illness patients perceive.

The Voice Handicap Index (VHI) is a questionnaire developed by Jacobson et al¹ with the purpose of quantifying the impact perceived by an individual affected by a voice disorder in the spheres of voice function itself, voice-related physical ability, and in the emotions provoked by the dysphonia.

Having assessed the VHI and the other instruments developed to study dysphonic patients' quality of life, such as the Voice-Related Quality of Life,² the Vocal Performance Questionnaire,³ the Voice Participation Profile,⁴ and the Voice Symptom Scale,⁵ the conclusion has been reached that the VHI is the most versatile and most patient-friendly questionnaire and the one that contains the most relevant information about voice-related quality of life.⁶

The VHI consists of 30 items organized into 3 groups of 10, the so-called physical, functional, and emotional sub-scales. It has subsequently been demonstrated that these sub-scales are not independent measurements of voice impairment and that they lack validity as such. This analysis of the VHI also served to develop a short version, when it was demonstrated that with 10 items selected from the original 30, the same power was achieved.^{7,8}

Some works have failed to find a relation between the VHI and the parameters that are typically analyzed as part of the study of dysphonia. Hsiung et al⁹ studied the correlation between the measurements obtained in the voice laboratory and the results of the VHI in dysphonic patients; a large discrepancy was detected between both assessments, leading to the conclusion that how a patient feels about his/her voice problem is not amenable to evaluation by objective measurements. This is commonly seen in voice consultations in patients who do not consider a treatment that has already been performed as particularly effective despite achieving excellent post-treatment results on objective measurements. Other studies, however, have shown that the total VHI score correlates well with the harmonic/noise ratio (HNR) in the acoustic analysis.¹⁰

The VHI has been adapted to the languages of many countries as a valid instrument in evaluating vocal impairment.¹¹ In Spain, the Phoniatry Committee of the Spanish Society for Otorhinolaryngology (SEORL) has translated the VHI in order to study the resulting version.

This work presents the results of the process for validating the questionnaire in our language.

MATERIAL AND METHOD

Development of the Spanish Version of the VHI

A translated Spanish version of the original VHI in English (Table 1) was produced for this study. After the first translation, the different items were discussed among the authors of this study and other professionals dealing with voice disorders. As a result, note was made of the suggestions to change some expressions. The modifications were introduced on the basis of linguistic and cultural differences. Of the 30-item translated questionnaire, 10 questions selected by Rosen et al⁷ were taken to create the short form or VHI-10 (Table 2).

Participants

Table 3 shows the number of participants and their demographic data, as well as the groups into which they were included.

Procedure

The VHI items were analyzed by comparing the individual answers of a first group of 162 patients referred due to dysphonia and a control group comprised of 38 healthy volunteers without a history of voice disorders recruited from among the patients' relatives, hospital personnel, and medical students.

The individuals in the dysphonic group were recruited voluntarily, after being informed on the nature of the study and providing verbal consent, from among the initial appointments at the Voice Clinic and the Phoniatrics Clinic between 2004 and 2006.

A second group of dysphonic patients was selected to analyze the VHI items before and after treatment. This group consists of 70 dysphonic individuals who had been treated by phonosurgery.

After filling in the form, the individuals underwent an objective voice evaluation and laryngoscopic examination.

Patient data were collected in an SPSS 10.0 statistical software database (SPSS, Inc, Chicago, Illinois, United States).

Each participant (patients and controls) filled in the questionnaire corresponding to the VHI-30 version in Spanish without help. The VHI-10 scores were taken from the VHI-30 questionnaire. Moreover, they were asked to rate the severity of their dysphonia using a 4-point scale (0, normal; 1, mild; 2, moderate; and 3, severe).

Statistical Analysis

The SPSS 10.0 programme was used for the following statistical tests: test-retest reliability, internal consistency, item/total correlation, validity, factorial structure analysis, item analysis, and comparisons between the VHI-30 and the VHI-10 versions in Spanish.

Test-Retest Reliability and Internal Consistency

Pearson's correlation was used to evaluate test-retest reliability of the Spanish version of the VHI-30 and the VHI-10, comparing the initial score and the one obtained between 2 and 8 weeks later, prior to undergoing any kind of treatment intervention, in 40 randomly selected patients. The internal consistency of both questionnaires was determined by means of Cronbach's alpha coefficient. To calculate item/total correlations, Pearson's correlation was used, taking into account that items whose item/total coefficients yielded values <0.35 should be discarded or reformulated.

Longitudinal Analysis of the Voice Handicap Index Items

The second group of dysphonic patients chosen for the analysis of the VHI items before and after treatment comprised 70 individuals who had undergone phonosurgery. These patients completed the questionnaire before the treatment intervention and at least 2 months afterwards. Table 3 presents the diagnoses. The item analysis before and after treatment was carried out by means of parametric analysis with a Student's 2-sample *t* test.

Construct Validity

The patients with the highest self-perceived dysphonia scores should have the highest scores on the VHI

Table 1. Spanish Version of the Voice Handicap Index (VHI-30)

Part I-F (functional)					
F1. My voice makes it difficult for people to hear me	0	1	2	3	4
F2. People have difficulty understanding me in a noisy room	0	1	2	3	4
F3. My family has difficulty hearing me when I call them throughout the house	0	1	2	3	4
F4. I use the phone less often than I would like to	0	1	2	3	4
F5. I tend to avoid groups of people because of my voice	0	1	2	3	4
F6. I speak with friends, neighbors, or relatives less often because of my voice	0	1	2	3	4
F7. People ask me to repeat myself when speaking face-to-face	0	1	2	3	4
F8. My voice difficulties restrict personal and social life	0	1	2	3	4
F9. I feel left out of conversations because of my voice	0	1	2	3	4
F10. My voice problem causes me to lose income	0	1	2	3	4
Part II-P (physical)					
P1. I run out of air when I talk	0	1	2	3	4
P2. The sound of my voice varies throughout the day	0	1	2	3	4
P3. People ask, "What's wrong with your voice?"	0	1	2	3	4
P4. My voice sounds creaky and dry	0	1	2	3	4
P5. I feel as though I have to strain to produce voice	0	1	2	3	4
P6. The clarity of my voice is unpredictable	0	1	2	3	4
P7. I try to change my voice to sound different	0	1	2	3	4
P8. I use a great deal of effort to speak	0	1	2	3	4
P9. My voice is worse in the evening	0	1	2	3	4
P10. My voice "gives out" on me in the middle of speaking	0	1	2	3	4
Part III-E (emotional)					
E1. I am tense when talking to others because of my voice	0	1	2	3	4
E2. People seem irritated with my voice	0	1	2	3	4
E3. I find other people don't understand my voice problem	0	1	2	3	4
E4. My voice problem upsets me	0	1	2	3	4
E5. I am less outgoing because of my voice problem	0	1	2	3	4
E6. My voice makes me feel handicapped	0	1	2	3	4
E7. I feel annoyed when people ask me to repeat	0	1	2	3	4
E8. I feel embarrassed when people ask me to repeat	0	1	2	3	4
E9. My voice makes me feel incompetent	0	1	2	3	4
E10. I am ashamed of my voice problem	0	1	2	3	4

questionnaires. To determine the correlation between the total scores on the Spanish version of the VHI-30 and the VHI-10 and self-perceived dysphonia, Pearson's method was applied. To determine if there are significant differences between the VHI-30 and the VHI-10 between the dysphonic group and the control group, an ANOVA and Tukey's procedure for multiple comparisons were used.

Analysis of the Factorial Structure

The principal component analysis applied to each item, complemented by Varimax rotation, enabled us to study the

appropriateness of grouping the items in the three sub-scales into which the original questionnaire is divided.

Analysis of the Items and Comparison Between the VHI-30 and the VHI-10

The mean scores on each item were compared between the control and dysphonic groups. In order to determine the sensitivity of the VHI-10, Pearson's correlation was used, as was the analysis of proportions between the total scores on the Spanish version of the VHI-10 and VHI-30. If the proportion between the VHI-10 and the VHI-30 is <0.333 ,

Table 2. Abbreviated Voice Handicap Index (VHI-10) in Spanish

F1. My voice makes it difficult for people to hear me	0	1	2	3	4
F2. People have difficulty understanding me in a noisy room	0	1	2	3	4
F8. My voice difficulties restrict personal and social life	0	1	2	3	4
F9. I feel left out of conversations because of my voice	0	1	2	3	4
F10. My voice problem causes me to lose income	0	1	2	3	4
P5. I feel as though I have to strain to produce voice	0	1	2	3	4
P6. The clarity of my voice is unpredictable	0	1	2	3	4
E4. My voice problem upsets me	0	1	2	3	4
E6. My voice makes me feel handicapped	0	1	2	3	4
P3. People ask, "What's wrong with your voice?"	0	1	2	3	4

the Spanish version of the VHI-10 is less sensitive than the VHI-30 in evaluating voice impairment.

RESULTS

Test-Retest Reliability

Forty patients completed the questionnaire on 2 occasions separated by between 2 and 8 weeks, without having received any treatment whatsoever during the intervening period. Test-retest reliability was found to be good for both the VHI-30 ($r=0.822$; $P<.001$) as well as for the VHI-10 ($r=0.852$; $P<.001$).

Internal Consistency and Correlation Item/Total

Cronbach's alpha coefficient, used to evaluate reliability or homogeneity of the questions (0=no reliability; 1=total reliability), yielded results indicating that the Spanish versions of both the VHI-30 and the VHI-10 are reliable ($\alpha=.93$ and $\alpha=.86$, respectively).

As regards item/total correlation, all the individual items revealed high correlations, for both the VHI-30 and the VHI-10 (Tables 4 and 5).

Longitudinal Analysis of the Items Corresponding to the Voice Handicap Index

Significant differences were found between the total postoperative and preoperative scores of the VHI-30 ($t=9.14$; $P<.000$) and VHI-10 ($t=9.98$; $P<.000$). The total postoperative scores were significantly lower than the preoperative ones.

Construct Validity

Significant correlations were found between the patients' self-perceived dysphonia severity score and the total scores on the VHI-30 ($r=0.76$; $P<.0001$) and the VHI-10 ($r=0.8$; $P<.0001$). Significant differences were seen between the group of patients with dysphonia and the control group in the VHI-30 ($F=112$; $P<.000$) and the VHI-10 ($F=150.47$; $P<.000$) scores. The total scores for the control group were significantly lower than those in the group of dysphonic patients (Table 6).

Table 3. Demographic Characteristics of the Participants

<i>Disorder</i>	<i>n (%)</i>	<i>Males, n (%)</i>	<i>Females, n (%)</i>	<i>Mean (SD), Years</i>
Dysphonic group	162	40 (24.7)	122 (75.3)	37.1 (12.3)
Vocal polyp	47 (29)			
Reinke's oedema	24 (14.8)			
Nodules	40 (24.7)			
Vocal cyst	7 (4.3)			
Vocal paralysis	3 (1.9)			
Sulcus	1 (0.6)			
Functional dysphonia	40 (24.7)			
Group before and after treatment	70	16 (22.9)	54 (77.1)	37.1 (10.8)
Vocal polyp	31 (44.3)			
Reinke's oedema	11 (15.7)			
Nodules	16 (22.9)			
Vocal cyst	3 (4.3)			
Functional dysphonia	8 (11.4)			
Control group	38	17 (44.7)	21 (55.3)	36.4 (15.3)

Analysis of the Factorial Structure

The main components of the Spanish version of the VHI-30 were analyzed. Five factors were found to have eigen values greater than 1 and account for 63.7% of the variance. The solution with the 5 components was rotated using the Varimax criterion for subsequent interpretation (Table 8).

Analysis of the VHI Items

The mean scores of the group of dysphonic patients were compared with those of the control group. The differences

Table 4. Item/Total Correlation and Measurement of the Reliability of the 30 Items in the VHI-30

<i>Item</i>	<i>Item/Total Correlation</i>
F1	0.66
F2	0.66
F3	0.55
F4	0.63
F5	0.62
F6	0.61
F7	0.44
F8	0.73
F9	0.69
F10	0.41
P1	0.61
P2	0.66
P3	0.59
P4	0.7
P5	0.73
P6	0.65
P7	0.67
P8	0.75
P9	0.56
P10	0.72
E1	0.76
E2	0.51
E3	0.53
E4	0.76
E5	0.57
E6	0.57
E8	0.48
E9	0.56
E10	0.46
Cronbach's α	.93

between both groups were statistically significant ($P<.000$) for all the items (Table 8).

Comparison Between the VHI-30 and VHI-10

The correlation between both questionnaires was significant ($r=0.95$; $P<.000$), as well as between the questionnaires and the patient-rated degree of severity. There was no correlation with respect to the harmonic/noise ratio

Table 5. Item/Total Correlation and Measurement of the Reliability of the 10 Items in the VHI-10

<i>Item</i>	<i>Item/Total Correlation</i>
F1	0.67
F2	0.7
F8	0.74
F9	0.67
F10	0.44
P5	0.7
P6	0.73
E4	0.64
E6	0.77
P3	0.54
Cronbach's α	.86

Table 6. Total Mean Scores of the Different Groups and Participants

<i>Group</i>	<i>VHI-30, Mean (SD)</i>	<i>VHI-10, Mean (SD)</i>
Dysphonia		
Polyp	40.9 (19.7)	14.8 (6.1)
Reinke's oedema	48.2 (19.3)	17.4 (7.1)
Nodules	45.5 (19.4)	16.8 (7.3)
Functional dysphonia	46.9 (21.5)	16 (8.1)
Control group	8.1 (9.8)	2.2 (2.6)

(Table 9). The proportion analysis yielded a mean result of 0.46, greater than the required 0.33 (Table 10).

DISCUSSION

The VHI is a psychometrically robust questionnaire designed to measure the impact a voice disorder has on vocal capacity and on patients' affectivity. This type of questionnaire is spreading into all fields of medicine in response to the importance of also assessing emotional aspects or patient quality of life, as part of a holistic approach toward the person. Of all the questionnaires developed for this purpose, the VHI is the most widely used and has been adapted and translated into different languages.^{12,13}

In any kind of research, an instrument's ability to collect data depends on 2 important attributes: validity and reliability. Validity refers to the instrument actually being able to measure what it seeks to quantify and reliability has to do with how much the data collected can be trusted, because there is consistent, stable repetition of the measurement.

Table 7. VHI-30 Factor Analysis (Varimax)

Items	Factors				
	1	2	3	4	5
F1	0.34	7.9E-02	0.19	0.10	0.72
F2	0.36	9.3E-02	0.24	6.7E-02	0.73
F3	0.12	0.13	0.16	0.15	0.76
F4	-0.11	3.6E-02	0.15	6.3E-03	0.32
F5	0.19	4.5E-02	0.82	0.13	0.19
F6	0.14	9.4E-02	0.8	0.17	0.22
F7	0.4	0.15	-1E-02	-9.7E-02	0.29
F8	0.38	0.31	0.57	0.2	0.14
F9	0.27	0.32	0.5	0.41	0.13
F10	9.7E-02	-0.12	0.42	0.57	3.5E-02
P1	0.53	0.23	2.8E-02	0.20	0.22
P2	0.83	5.9E-02	0.11	8.5E-02	5.4E-02
P3	0.75	-0.10	6.3E-02	0.22	0.22
P4	0.73	4E-02	1.9E-02	0.18	0.28
P5	0.77	0.16	0.13	8.7E-02	0.14
P6	0.67	6.9E-02	0.2	8.3E-02	-9.8E-02
P7	0.38	0.18	0.28	0.35	8.6E-02
P8	0.72	0.14	0.15	0.18	0.25
P9	0.62	0.11	0.23	2.8E-02	3.8E-02
P10	0.67	0.25	0.26	6.9E-02	4.1E-02
E1	0.26	0.41	0.47	0.41	0.15
E2	2.7E-02	0.21	2.2E-02	0.73	9.4E-02
E3	0.23	0.19	6.5E-02	0.56	7E-02
E4	0.59	0.37	0.25	0.14	0.2
E5	0.27	0.13	0.22	0.71	0.1
E6	0.1	0.45	0.32	0.47	0.15
E7	0.17	0.56	0.29	0.18	0.12
E8	0.11	0.85	4E-02	0.12	8.2E-02
E9	0.22	0.52	0.16	0.48	5E-02
E10	0.16	0.81	6E-02	8.6E-02	8.5E-02

The purpose of this study was to assess the psychometric properties of the Spanish version of the VHI-30 and VHI-10. The results reveal strong internal consistency and test-retest reliability for both questionnaires. Validity is demonstrated by the significant correlations achieved between the total scores and patient self-perceived severity of dysphonia. Both the control group, as well as the questionnaires completed following treatment presented lower total scores than those corresponding to the dysphonic group and the control of the dysphonic

Table 8. Mean Differences in the Item Scores Between the Dysphonic and the Control Groups

Functional Scale		Physical Scale		Emotional Scale	
Item	Difference	Item	Difference	Item	Difference
F1	1.31	P1	1.61	E1	0.97
F2	1.44	P2	2.50	E2	0.31
F3	0.80	P3	2.51	E3	0.65
F4	0.83	P4	2.21	E4	1.82
F5	0.83	P5	2.17	E5	0.60
F6	0.70	P6	2.06	E6	0.38
F7	1.12	P7	1.01	E7	0.53
F8	1.20	P8	2.05	E8	0.18
F9	0.82	P9	1.87	E9	0.52
F10	0.43	P10	1.77	E10	0.33

Table 9. Pearson's Correlation Between the Total Scores on the VHI-30, the VHI-10, the Degree of Severity of the Dysphonia Rated by the Patient and the Harmonics to Noise Ratio (HNR)

	VHI-30	VHI-10	Degree	HNR
VHI-30	1.000	0.957 0.000	0.782 0.000	-0.154 0.016
VHI-10	0.957 0.000	1.000	0.755 0.000	-0.115 0.168
Grado	0.782 0.000	0.755 0.000	1	-0.130 0.040
HNR	-0.154 0.016	-0.115 0.168	-0.130 0.040	1.000

Table 10. Ratio of the Total Scores Between the VHI-10 and the VHI-30, Analyzed Separately in Each Group of Participants

Group	VHI-10:VHI-30 Ratio (SD)
Dysphonia	
Polyp	0.47 (0.11)
Reinke's oedema	0.48 (0.12)
Nodules	0.46 (8.8) E-02
Functional dysphonia	0.33 (0.19)
Control group	0.33 (0.12)

patient group and the preoperative questionnaires, which proves that the VHI discriminates individuals who suffer voice impairment from those who do not. The validity of the questionnaire is also maintained for the short form (VHI-10).

Cronbach's alpha coefficient was used to assess reliability or the homogeneity of the questions; this method allows for values between 0 and 1. An $\alpha=.93$ was obtained for the VHI-30 and $\alpha=.86$ for the VHI-10, thereby proving the reliability of both questionnaires.

The study of the mean VHI-30 and VHI-10 scores and the analysis of proportions seeks to demonstrate the robustness of the VHI-10 items. If they were less sensitive than the VHI-30 in detected voice impairment, the ratio between the VHI-10 and VHI-30 would be <0.33 . The ratios found were consistently higher, which indicates that the VHI-10 is a strong representation of the VHI-30 in Spanish, as demonstrated for the original questionnaire.⁷

The item/total correlation detected for the VHI-30 and VHI-10 indicates the linear correlation between the item and total score obtained. Those that do not exceed a value of 0.35 must be discarded or reformulated. All the items corresponding to the VHI-30 and VHI-10 exceed this figure; hence, they contribute to the questionnaire's reliability.

The principal component analysis performed in this study sought to analyze the appropriateness of maintaining the 3 originally established sub-scales of the VHI-30 (functional, physical, and emotional) in the Spanish version.

This study shows that all the items of the physical sub-scale are grouped around a single factor, whereas the items pertaining to the functional and emotional sub-scales are distributed among four different factors, although a tendency is seen towards a preferential grouping around 2 of them. In order to improve this section of the study, more completed questionnaires would be needed by individuals with a wider variety of voice disorders. The interpretation of this finding is that, for the Spanish version of the VHI, the factorial structure of the questionnaire as reported by its author¹ is maintained.

Insofar as the VHI-10 is concerned, the decision was made to translate the one developed by Rosen et al instead of describing a different one using the Spanish translation of the VHI-30 as the starting point so as to avoid adding more variations. Thus, this work focused on studying the translated VHI-10; it was found to be reliable and neither usefulness nor validity is lost with respect to the VHI-30 in Spanish when evaluating a patient's voice impairment.

The lack of correlation between the HNR values and the scores on both questionnaires is striking, given that this objective parameter is closely related to the severity of the dysphonia and the pathological spectrogram.¹⁴

This finding may be an indication that the VHI is an instrument that other voice parameters do not affect. An analysis of the evolution of objective pre- and post-operative voice parameters would make it possible to clarify this point.

The cultural affinities between the area for which the questionnaire was originally designed and the one in which this translation and validation for Spanish speakers was carried out are such that VHI can be reliably used without major question-content modifications. In this work, the suggestions provided by the different collaborators were collected and taken into consideration. The literal translation

of item F10 is "The problem with my voice determines a decrease in my income," and was replaced by "My voice problem affects my performance at work" because many professionals who use their voices at work do not suffer a wage decrease due to voice impairment and this sentence includes those patients who are also affected economically.

Finally, it must be pointed out that this translation and validation is based on the Spanish that is spoken in Spain; hence, the questionnaire should be adapted and validated for application in the various spanish-speaking countries.

CONCLUSIONS

The present work proves the validity and reliability of the VHI-30 and VHI-10 translated into Spanish.

Given that the VHI-10 loses none of its usefulness or validity, the authors recommend its use as a robust tool that is easier to complete and manage than the VHI-30.

Each country or region should adapt the questionnaires to the linguistic or cultural differences with respect to the Spanish spoken in Spain.

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