Psychometric properties of Spanish version of QIDS-SR$_{16}$ in depressive patients

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Introduction. Depression is a worldwide health problem. Thus, making the diagnosis with reliable and short tests is crucial. In this regard, the Quick Inventory of Depressive Symptomatology-Self Report (QIDS-SR$_{16}$) has been validated in several countries. It was found that this instrument has a correct balance between time and reliability. This study has aimed to assess psychometric properties of QIDS-SR$_{16}$ Spanish version, and to calculate several cutoffs to evaluate the depressive disorder severity.

Method. The study was based on the data from the RESIST study that recruited 1595 depressive patients from 17 regional communities. Instruments used were Hamilton Depression Rating Scale (HDRS$_{17}$) and Spanish version of QIDS-SR$_{16}$. Statistical analyses included test-retest reliability and internal consistency calculation, and exploratory factor analysis. In addition, ROC curve was calculated in order to determine different cutoff values.

Results. QIDS-SR$_{16}$ shows adequate test-retest reliability and high internal consistency (α=0.871), as well as ROC value of 0.946. Exploratory factor analysis showed a one factor model, which accounted for 46.80% of variance. Convergent validity and sensitivity to change were adequate.

Discussion. The results suggest that the QIDS-SR$_{16}$ is a reliable test to assess depressive symptom severity in the Spanish population. The cutoff that shows the best sensitivity/specificity rate was a total score of 7.

Keywords: Depression, Assessment, QIDS-SR, Validation, Cut-off points, Psychometric properties

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Propiedades psicométricas de la versión española de la escala QIDS-SR$_{16}$ en pacientes con trastorno depresivo

Introducción. La depresión es un problema de salud mental a nivel mundial, por lo que mejorar el diagnóstico con pruebas fiables y breves es crucial. En este sentido, la escala *Quick Inventory of Depressive Symptomatology-Self Report* (QIDS-SR$_{16}$) ha sido validada en distintos países encontrando que es un instrumento con un correcto equilibrio entre fiabilidad y tiempo. El objetivo del estudio es evaluar las propiedades psicométricas de la versión española del QIDS-SR$_{16}$ y proporcionar puntos de corte para valorar la gravedad del trastorno depresivo.

Metodología. Basado en los datos del estudio RESIST que reclutó 1595 pacientes depresivos en 17 comunidades autónomas. Los instrumentos utilizados fueron la Escala Hamilton para la Evaluación de la Depresión de 17 ítems (HDRS$_{17}$) y la versión española del QIDS-SR$_{16}$. El análisis estadístico incluyó procedimientos para determinar la fiabilidad test-retest, la consistencia interna, y explorar la naturaleza dimensional del cuestionario, así como el cálculo de la curva ROC para determinar diferentes puntos de corte.

Resultados. El QIDS-SR$_{16}$ muestra una buena fiabilidad test-retest y una alta consistencia interna (α=0.871), así como una curva ROC cuyo valor es 0.946. El análisis factorial exploratorio indica la existencia de un factor que explica el 46.80% de la varianza. La validez convergente y la sensibilidad al cambio han sido adecuadas.

Conclusiones. Los resultados sugieren que el QIDS-SR$_{16}$ es un instrumento fiable evaluar la gravedad de la sintomatología depresiva en población española. El punto de corte que ofrece un mejor balance entre sensibilidad y especificidad se sitúa en una puntuación total de 7.

Palabras clave: Depresión, Evaluación, QIDS-SR, Validación, Puntos de corte, Propiedades psicométricas

INTRODUCTION

Depression is a significant public health problem. The epidemiological data published regarding its prevalence indicate that about 17% of adults experience a major depressive disorder during their lifetime and 7% during a 12-month period.[1] According to the ESEMeD-Spain study data, major depressive disorder is the most frequent mental disorder in the general population, with 10.6% prevalence during lifetime and 4.0% in the last year.[2] Also in Spain, the SCREEN Study found that 29.0% of the patients who came to primary care had a major depressive disorder.[3]

Furthermore, depressive disorders generate high incapacity. The World Health Organization states that depression is the fourth health condition contributing to the global disease load and that it is expected to be the first in the most industrialized countries in 2030.[4] It is also associated with a higher mortality rate, high levels of use of health care services, enormous economic costs and it is the principal risk factor for suicide. All these reasons have led to considering depression as an important public health problem worldwide that requires a better diagnosis and treatment.[5]

Availability of instruments facilitating early identification has high clinical importance within this context. Valid, reliable and brief instruments are needed for screening and diagnosis of this disorder as well as for the assessment of its severity and changes in its evolution. Determination of the severity of depression has important implications. One of them is the choice of the type of treatment (psychological or drug therapy or both) which is thus reflected in many guides.[6-11] On the other hand, periodic evaluation of severity makes it possible to monitor evolution and changes in the symptoms. Thus, it is a good measurement to evaluate treatment efficacy or effectiveness in both the usual clinical practice and in the research field.

There are many instruments to evaluate severity of the depressive symptoms. Those used most are the Hamilton Depression Rating Scale (HDRS),[12] Montgomery-Asberg Depression Scale[13], Beck Depression Inventory (Beck et al., 1961)[14]. The short versions of these instruments help to decrease the resources needed for their application and contribute to faster identification of the depression in different care levels. Furthermore, they are of utility for their use in research since time and tiredness of the participants in most of the studies are very important. Among the short instruments used most that evaluate severity of the depression is the 17-item version of the Hamilton Scale.[15] The Patient Health Questionnaire (PHQ-9)[16] is another widely used instrument, since it makes it possible to evaluate severity of depression in only 9 items, that refer to the 9 core symptoms of depression proposed by the DSM classification.[17]

A recently used instrument in the American Study Star*D is the Inventory for Depressive Symptomatology (IDS-30).[18,19] There are two short versions of the IDS, both in hetero-applied and self-report format. Both versions only have those items of the complete versions that are necessary to evaluate the 9 core criteria of depression proposed by the DSM-5.[17] Both the version administered by the clinician, the Quick Inventory of Depressive Symptomatology- clinician-rated (QIDS-C_{16})[20] as well as the self-report version, the Quick Inventory of Depressive Symptomatology-Self Report (QIDS-SR_{16})[20] can be administered in a few minutes (5-7) so that they are cost-effective.[21] The QIDS-SR_{16}, whose psychometric properties are evaluated in this work, includes 16 items in which the subject selected the statement that best describes how he/she has felt in the last 7 days, scoring them from 0 to 3 based on severity. The items include sleep disorders (4 items), sad mood state (1 item), changes in appetite and weight (4 items), concentration and/or decision making (1 item), self-criticism (1 item), suicidal ideation (1 item), interest (1 item), energy level (1 item) and restlessness (2 items). Total score of the QIDS-SR_{16} ranges from 0 to 20 and the higher scores indicate greater severity of the depressive symptoms.

A large amount of evidence is available on the validity and reliability of the QIDS in patients with depression in different countries and languages.[20,22-24] Different cutoffs have also been proposed regarding severity of the disorder based on the original instrument: without depression (0-5), mild depression (6-10), moderate depression (11-15), severe depression (16-20), very severe depression (≥21).[20] We are not aware of data in Spain and no cutoff had been provided previously in the Spanish population to determine the severity of depressive symptoms. It would be very useful to have a validation in Spanish of this instrument and to provide cutoffs of the measurement in the Spanish population.

The purpose of this study is to evaluate the psychometric properties, in terms of validity and reliability, of the version in Spanish of the QIDS-SR_{16} scale, using the $HDRS_{17}$ scale as reference test and also provide cutoffs to determine severity of the depressive symptoms and course of the disease.

METHODOLOGY

Design and sample

Data from the RESIST study, an epidemiological, national, prospective study with two evaluations, naturalist and multicenter were used for this work.[25] A geographically stratified sample of 400 psychiatrists proportionally distributed according to the 17 regional Spanish communities was chosen. Each psychiatrist invited 4 or 5 patients to participate. The patients had to be at least 18 years of age, meet the DSM-IV criteria for major depression[26]

and have signed the informed consent. The evaluations were performed during 2 routine visits. They were carried out after 6-8 weeks of treatment and at 10±2 weeks after the first evaluation. The sample was made up of 1595 patients with MDD who came to the psychiatry outpatient clinic. Of the initial 1870 patients, 275 were excluded due to different reasons: change of treatment (9.1%), patients without second evaluation (3.6%) and incomplete or lost data (1.9%).

This study received the approval of the Teknon Foundation Ethics Committee (and follows the ethical guidelines of the Declaration of Helsinki with a revision of the year 2000). The complete details of the methodology used can be consulted in Roca et al., 2011.

Instruments

Case report form (CRF): filled out by the psychiatrist. It includes the DSM-IV criteria of major depressive disorder. Sociodemographic data (Age, gender, civil status, work situation, level of studies and place of residence), clinical characteristics of MDD (age at onset of first depressive episode, duration of episode, number of previous episodes), psychiatric and medical comorbidity were also collected.

Hamilton Depression Rating Scale, 17-item version (HDRS-17)[12] is a 17-item heteroapplied scale designed to be used in patients diagnosed of MDD in order to evaluate the severity of depression and changes of the patient. It is filled out in accordance with the information obtained in the clinical interview. Each item has 3-5 response options based on severity. This scale was used a reference test. Following the suggestions of the previous literature,[27,28] clinical remission criterion was located at a total score equal to or less than 7.

Spanish version of the QIDS-SR16:[20] The 16-item self-report version used in this study was taken from the IDS-SR30 scale[18,19] that can be consulted on the official web page of the IDS/QIDS questionnaires.[29] Several translations have been made into Spanish in Latin American countries and Spain. The specific version for the Spanish population was selected for this study. This instrument is used as a screening tool and to assess the severity of the depressive symptoms. It is sensitive to changes due to medication, psychotherapy or somatic treatments, so that it is useful for both clinical and research objectives.

Statistical analyses

In the first place, descriptives of the sociodemographic and clinical characteristics were generated. In order to calculate the test-retest reliability, a correlation was made between the scores of each item in regards to onset and at 6 months. In order to calculate the internal consistency of the questionnaire, Cronbach's α reliability coefficient was used. In addition, it was calculated with the Spearman-Brown's split half correction method.

The ROC curve was used to calculate the different cutoffs. Based on its data, the values of sensitivity, specificity, positive predictive value and negative predictive value were calculated for each one of the proposed cutoffs, as well as that indicated in the original English version.

To calculate the number of factors that underlie the questionnaire an exploratory factor analysis procedure was used, For this procedure, selection criteria was established as a value characteristic of each factor greater than 1. Regarding the calculation of the convergent validity of the questionnaire, it was decided to perform Pearson's correlation between the items and the total score of the QIDS-SR with the total score of the reference test.

Finally, for the calculation of sensitivity to change, the participants were grouped into two groups, clinical remission and depression, according to the scores on the reference test and using the cutoff proposed in the literature.[28] After, the T test was used to compare the means of the scores on the QIDS-SR of the two groups.

Statistical significance criterion was established at 0.05.

RESULTS

Table 1 shows the clinical and sociodemographic characteristics of the sample. The analyses were conducted in 1595 patients, 553 (34.6%) of whom were men and 1042 (65.3%) women, with mean age of 47.7 years (range 18-88). Most of the patients were married (61%), working at the time of the evaluation (45%), and lived in an urban setting (72%). Additionally, descriptive statistics were calculated for each one of the items at two points in time of measurement. Table 2 offers detailed information on them.

Time stability

Correlation between each item in the first and second evaluation is shown in Table 2. Item 4 shows high value of the asymmetry statistics and kurtosis as it is greater than 2.00 and 7.00, respectively, which is an indicator that the adjustment to the parametric normality is not adequate. It is precisely this item, that corresponding to hours of sleep, the only one whose correlation regarding the retest is less than 0.70. However, this is significant at a 99% confidence level. The rest of the items show some values of kurtosis and asymmetry within the limits of normality, and high test-retest reliability. All the correlations are superior to 0.70 and significant at a 0.99 confidence level.

Table 1 Sociodemographic and clinical data of the sample

Sociodemographic variables	n (%)
Gender	
Man	553 (34.6)
Woman	1042 (65.3)
Age	47.73 (13.14)
≤30	155 (9.71)
31-50	780 (48.90)
50≥	660 (41.37)
Occupational status	
Employed	728 (45.0)
Student	41 (2.4)
Unemployed	189 (11.8)
Household tasks	383 (24.0)
Retired	254 (15.9)
Civil Status	
Single	315 (19.7)
Married	973 (61)
Widow(er)	111 (7)
Separated	196 (12.3)
Education level	
Incomplete primary	296 (18.6)
Complete primary	529 (33.2)
Secondary	506 (31.7)
University	264 (16.6)
Living arrangement	
Alone	280 (17.6)
Accompanied	1315 (82.4)
Setting	
Rural	446 (28)
Urban	1149 (72)
Clinical Variables	**Mean (Deviation)**
Age at first episode	40.31 (13.15)
Length of episode	14.2 (9.4)
Number of previous episodes	3.72 (2.9)
QIDS-SR First evaluation	17.31 (8.20)
HDRS$_{17}$ First evaluation	17.3 (8.3)
QIDS-SR severity	n (%)
None (0 - 6)	200 (12.5)
Low (8 - 13)	357 (22.4)
Moderate (14 - 19)	416 (26.1)
Severe (20 - 25)	347 (21.8)
Very severe (>26)	275 (17.2)
HDRS$_{17}$ severity	
None (0 – 13)	200 (12.5)
Low (14 - 25)	286 (17.9)
Moderate (26 - 38)	352 (22.1)
Severe (39 - 48)	626 (39.2)
Very severe (>49)	131 (8.2)

Internal consistency

The global internal consistency of the scale evaluated with Cronbach's α statistics is 0.871. In the item by item analysis of the α value, the scale behaved homogeneously and no irrelevant items appeared that harmed the global α of the QIDS. Table 3 shows the α statistics value for each item in case it were eliminated and the mean and variance explained for each item. Additionally, internal consistence was verified using the two halves method with Spearman-Brown correction, obtaining a value of 0.850.

As a whole, both Cronbach's α and the Spearman-Brown correction indicate correct internal consistency of the scale.

Cutoff

In order to calculate sensitivity and specificity of the questionnaire for different cutoffs, we calculated the ROC curve. Using the original value proposed, that is, a total score equal to or greater than 6, as cutoff, the result of the area under the ROC curve is 0.946. For this same cutoff, the diagnostic sensitivity value was located at 98% while specificity reached 63%. In regards to the predictive value of the test, using a score equal to or greater than 6 as depression criterion, positive predictive value was equal to 0.95 while the negative predictive value was 0.86.

Using the different values obtained with the ROC curve, the results of sensitivity, specificity, positive predictive value and negative predictive value were calculated for different cutoffs. Table 4 shows detailed information on the results of these calculations.

Exploratory factor analysis

The exploratory factor procedure indicated adequate value of the Kaiser, Meyer and Olkin test for the sample, (KMO=0.894). On its part, the Bartlett sphericity test provided

Table 2 | Test-retest. Correlation of the items at onset and at 6 months

QIDS-SR Item	First moment			Second moment				
	Mean (D)	Asymmetry	Kurtosis	Mean (D)	Asymmetry	Kurtosis	Correlation	p value
Item 1	1.41 (0.99)	0.11	-1.03	2.09 (1.28)	-0.32	-1.02	0.78	≤0.001
Item 2	1.44 (1.08)	0.13	-1.25	1.97 (1.32)	-0.22	-1.18	0.75	≤0.001
Item 3	1.14 (1.15)	0.45	-1.28	1.78 (1.37)	0.01	-1.33	0.76	≤0.001
Item 4	0.22 (0.57)	2.99	9.27	0.20 (0.46)	2.56	7.55	0.34	≤0.001
Item 5	1.92 (0.91)	-0.33	-0.88	2.62 (1.14)	-0.69	-0.27	0.81	≤0.001
Item 6 and 7	1.03 (0.87)	0.52	-0.40	1.57 (1.27)	0.19	-1.16	0.75	≤0.001
Item 8 and 9	1.07 (1.07)	0.57	-0.99	1.26 (1.27)	0.55	-1.00	0.76	≤0.001
Item 10	1.65 (0.87)	0.07	-0.81	2.40 (1.13)	-0.44	-0.57	0.74	≤0.001
Item 11	1.33 (0.88)	0.24	-0.64	2.29 (1.17)	-0.39	-0.69	0.72	≤0.001
Item 12	0.77 (0.77)	0.77	0.15	1.53 (1.38)	0.23	-1.38	0.75	≤0.001
Item 13	1.69 (0.97)	0.01	-1.12	2.29 (1.17)	-0.39	-0.69	0.73	≤0.001
Item 14	1.59 (0.84)	0.10	-0.67	2.42 (1.15)	-0.44	-0.63	0.71	≤0.001
Item 15	1.13 (0.86)	0.41	-0.47	1.80 (1.22)	-0.12	-1.10	0.73	≤0.001
Item 16	0.91 (0.78)	0.69	0.24	1.56 (1.22)	0.12	-1.13	0.72	≤0.001

a statistically significant result (χ^2=11691,39; p≤0.001), which, together with the result of the KMO test, leads to the conclusion that the distribution of the data is adequate for the factor analysis procedure. The factor analysis indicated the existence of a single factor that explains 46.80% of the variance, and whose own value is located at 6.084.

Convergent Validity

The correlation of the items on the QIDS-SR scale shows that all of them are significantly related with the HDRS$_{17}$ except item number 4 that corresponds to the amount of hours of sleep. The relation of this item with the reference test is equal to -0.016 although the relation is not statistically significant (p=0.535). In regards to the total score of the QIDS-SR questionnaire, this is related positively with the total score of the HDRS$_{17}$ (r_{xy}=0.845), this relation reaching statistical significance (p≤0.001). Finally, the correlation between the score in HDRS$_{17}$ and the factors obtained by factor analysis show that the factor having the greater value per se shows a significantly high relation with the reference test (r_{xy}=0.852; p≤0.001). Table 5 shows detailed information on the relation between the items of the QIDS-SR and the HDRS$_{17}$, and the total score of QIDS and the factor extracted from it.

Sensitivity to change

To establish the capacity of the scale to detect change in the depressive symptoms, a comparison was made of means for related samples on the total score of the QIDS-SR. The sample was divided into depressed patients (n=703) and patients in remission (n=892) based on the score on the HDRS$_{17}$. As has been established for the remission criteria, if the total score on the reference test was less than 7, it was considered that the patient was in clinical remission. The result of the comparison of means indicated that there were significant differences between both groups (t=33.29; p≤0.001), the group of patients in remission being that which obtained a lower mean score ($\bar{X}$=5.78; σ=3.88) compared to the depressed group of patients ($\bar{X}$=13.22; σ=5.04).

CONCLUSIONS

The main conclusion of our study is that the version in Spanish of the QIDS-SR scale has adequate psychometric

Table 3 Internal consistency of the QIDS-SR scale

Item	Mean†	Variance †	Cronbach's α †
Item 1: Falling asleep	15.89	58.61	0.864
Item 2: Sleep during the night	15.87	56.81	0.861
Item 3: Waking up too early	16.16	56.02	0.861
Item 4: Hours of sleep	17.08	66.83	0.879
Item 5: Sadness	15.38	56.51	0.854
Item 6 and 7: Appetite alteration	16.27	58.62	0.881
Item 8 and 9: Decreased weight	16.23	57.56	0.885
Item 10: Concentration/Decision making	15.65	57.34	0.855
Item 11: View of one's self	15.98	57.73	0.857
Item 12: Thoughts of death or suicide	16.53	59.58	0.860
Item 13: General Interest	15.61	55.69	0.852
Item 14: Energy level	15.71	57.36	0.855
Item 15: Feeling slowed down	16.18	57.77	0.857
Item 16: Feeling restless	16.40	61.92	0.869
Total QIDS-SR	17.31	67.22	0.871

†: Value of central tendency, dispersion and internal consistency if the item is eliminated

Table 4 Diagnostic properties for different cutoffs

Cutoff	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
6	98	63	95	86
7	97	75	96	77
8	94	79	97	65
9	91	84	97	56

Table 5 Convergent validity - QIDS-SR correlation with HDRS$_{17}$

	Correlación	Valor p
Item 1: Falling asleep	0.523	≤0.001
Item 2: Sleep during the night	0.570	≤0.001
Item 3: Waking up too early	0.586	≤0.001
Item 4: Hours of sleep	-0.016	0.535
Item 5: Sadness	0.662	≤0.001
Item 6 and 7: Appetite alteration	0.528	≤0.001
Item 8 and 9: Decreased weight	0.472	≤0.001
Item 10: Concentration/Decision making	0.614	≤0.001
Item 11: View of one's self	0.588	≤0.001
Item 12: Thoughts of death or suicide	0.630	≤0.001
Item 13: General Interest	0.635	≤0.001
Item 14: Energy level	0.631	≤0.001
Item 15: Feeling slowed down	0.620	≤0.001
Item 16: Feeling restless	0.431	≤0.001
Total QIDS-SR	0.845	≤0.001
Factor 1	0.852	≤0.001

properties and therefore is a useful instrument to evaluate severity of the depressive symptoms in the Spanish population.

The global internal consistency of the version in Spanish of the QIDS-SR was adequate (α=0.871), and the item by item analysis indicated that there were no elements that alter the general consistency of the scale, in spite of the asymmetry and kurtosis of item 4. In addition, the test-retest procedure corroborated these data on the internal consistency of the scale. The results found are convergent with the findings of previous studies (α=0.86)[11]; (α=0.769)[30], (α=0.86)[22]; (α=0.81)[20]. In regards to temporal stability evaluated with the test-retest procedure, the items maintained high association between both time periods, which suggests that the temporal stability is good. The only item that did not show high association, in spite of being significant, is that corresponding to hours of sleep, which was also characterized by elevated asymmetry. Temporal stability coincided with the previously published data.[11]

Our results suggest the existence of a single factor that explains almost 46.8% of the variance observed. However, this value is below that obtained by other authors.[11,24,28] Convergent validity of the QIDS-SR scale compared to the reference test is elevated for each item separately as well as for the global score of the scale. The only element that is not related in the same direction is once more that corresponding to hours of sleep. In regards to the extracted factor, there is also a significant relation and in the same direction as the scores of the HDRS$_{17}$. This result coincides

with the study performed by Rush et al., 2003, (c=0.81)[20] where a close correlation between both instruments was also found.

Regarding the diagnostic properties, the area under the curve offers an elevated value that makes it possible to classify the test with a good diagnostic accuracy. In regards to the original proposed cutoff of 6,[20] it obtains good sensitivity value. However, the specificity of the test suffers, resulting in a proportion of subjects without depression correctly identified at 63%. Considering the data of our study, the optimal cutoff is 7, since it maintains a sensitivity that is only 1% less than the original cutoff and elevates specificity up to 75%. The predictive values associated to this cutoff indicate a correct probability of association between presence or absence of diagnosis and existence of the depressive picture. In addition, we have considered the data from other cutoffs. However, none of them offers better balance between diagnostic indexes than the cutoff equal to 7. This does not coincide with other previously performed validations. This is the case of the Turkish validation of the instrument that places the cutoff at 9[30] or the Chinese one, which places it at 5.[24] Finally, the results of the analysis of the sensitivity to change suggests that the QIDS-SR can be an adequate instrument to detect if the depressive disorder remits, coinciding with Rush et al., 2003.[20]

In conclusion, the findings obtained in this study indicate that the version in Spanish of the QIDS-SR instrument has adequate psychometric properties and valid cutoffs to determine the severity of the depressive symptoms and the evolution of the disease compared with the original version of the instrument[20] and other validations in other countries. The QIDS-SR is a suitable instrument for clinical use and research with satisfactory properties in the Spanish population.

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