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Validity of the Sinhala version of the Centre for Epidemiological Studies Depression Scale (CES-D) in out-patients

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Abstract

Objectives To translate and validate the Sinhala version of the Centre for Epidemiological Studies Depression scale (CES-D) for diagnosing depression in out-patients.

Design A combined qualitative and quantitative approach was used for the translation of the CES-D. Sample size was calculated to detect a targeted sensitivity and specificity of 85%. The sample consisted of 75 participants diagnosed with major depressive disorder according to DSM IV criteria and 75 gender matched controls. Criterion validity was assessed using receiver operating charact-eristic (ROC) analysis. The Structured Clinical Interview for DSM-IV (SCID-II) conducted by a psychiatrist was used as the gold standard.

Results Mean age of the sample was 33 years. There were 91 females (60.7%). There was significant difference in the mean CES-D scores between cases (13.94) and controls (6.58) [t=14.50, df=148, *p*<0.001]. A score of ≥16 gave a sensitivity of 84% and specificity of 92%. A score of ≥21 gave a sensitivity of 73.3% and specificity of 96%. The Cronbach's alpha was 0.93. The four items that were reverse coded had poor correlation with total scores. The average correlation coefficient for the reverse-scored items was 0.35 and for the rest of the items 0.63. Principal component analysis with oblique rotation identified four factors. Factor 1 corresponds to the "depressed affect" and "somatic complaints" in the original model proposed by Radloff. Factor 2 corresponds to the interpersonal concerns. Factors 3 and 4 loaded the reversed coded items.

Conclusions The Sinhala version of the CES-D is a valid and reliable instrument for diagnosing major depressive disorder.

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Introduction

The Global Burden of Disease Study 2010 identifies that mental and behavioural disorders are a main contributor to Years Living with Disability (YLD) [1]. According to this study, major depressive disorder was the second leading cause of YLD and contributed 8.1% of total YLDs.

In clinical settings the diagnosis of depressive disorder is made according to either the ICD-10 or the DSM IV criteria, based on symptoms elicited during clinical interviews [2, 3]. This process requires a trained clinician to make the diagnosis. Diagnostic scales can be used for screening and diagnosing of depressive disorder. These scales are interviewer administered or self-administered. Scales are often used in epidemiological studies where a large number of people are screened and in clinical research. The main advantages of scales are the abilities to identify depression without the need for a detailed clinical interview and to quantify the severity of depression. However the main disadvantage is that scales tend to overestimate the prevalence of depression.

The Centre for Epidemiological Studies Depression Scale (CES-D) is a short, self-reporting scale designed to measure depressive symptoms in the general population and clinical populations [4]. Validity of the CES-D has been established by correlation with other self-report scales and with clinical diagnosis of depression. It is designed for use in population surveys and can be used by lay interviewers. It has an internal consistency of 0.85 in the general population and 0.9 in patient populations [5]. It has adequate test re-test reliability. Factor analysis has shown that the specific depression symptom factors are relatively robust and well established [6]. The CES-D has been widely used in epidemiological studies which estimate prevalence of depression [7-9].

Diagnostic scales should be translated and adapted to suit the culture in which it is used. This is especially important for scales which identify depression, because of the culture specific terms used in such scales. The psychometric properties of the CES-D has not been assessed in Sri Lankan populations. Therefore we translated and culturally adapted the CES-D and examined the validity, reliability and the factor structure of the adapted scale in an out-patient population in Sri Lanka.

Methods

The CES-D is a 20 item scale. Each item is scored from 0-3 based on the frequency of occurrence of symptoms over the past one week. The scoring of four positive items is reversed. Possible range of scores is zero to 60, with higher scores indicating the presence of more symptomatology [4].

A combined qualitative and quantitative approach was used for the translation of the CES-D [10]. A panel of six experts who were bilingual first translated the scale individually. These translations were then discussed in a group consisting of all six experts. The best translation for each item of the scale was decided by consensus of the group. Certain items in the scale required adaption appropriate to the Sri Lankan culture. For example *I felt that I could not shake off the blues* could not be directly translated into Sinhala. The term depression when used to describe a mood has no direct Sinhala translation. The corresponding word "duka" which means "sadness" was used in the translation. The final translated scale was back translated to English by a bilingual expert who was unaware of the original scale and compared with the original scale. The translated scale was pre-tested on a group of 20 people in the community.

Sample size was calculated assuming a sensitivity and specificity of 85%. Sample consisted 75 participants diagnosed with major depressive disorder according to DSM IV criteria and 75 gender matched controls. Cases were recruited from the out-patient clinic of the University Psychiatry Unit, National Hospital of Sri Lanka, Colombo. Controls were selected from the community following a screening assessment to exclude depression. The participants were invited to complete the CES-D questionnaire by a research assistant.

Written informed consent was obtained from all participants and ethical approval was obtained from Ethics Review Committee of the Faculty of Medicine, University of Colombo.

Statistical analysis

Statistical analysis was done using SPSS Statistics version 18.0 [11]. Internal consistency was measured using Cronbach's alpha. Criterion validity was assessed using receiver operating characteristic (ROC) analysis which gave the sensitivity and specificity of the CES-D at different cut-off points. The Structured Clinical Interview for DSM-IV (SCID-II) conducted by a psychiatrist was used as the gold standard [12].

Results

The sample consisted of 75 cases and 75 controls. The mean age of the sample was 33 years. There were 91 females (60.7%). The controls (28.33 years) were significantly younger than the cases (37.51 years) [t=3.48, df=118, p=0.001]. There was no significant difference in gender distribution between cases and controls (χ^2=1.45, df=2, p=0.485). There was significant difference in the mean CES-D scores between cases (13.94) and controls (6.58) [t=14.50, df=148, p<0.001].

Validity

Receiver operating characteristic (ROC) analysis gave the sensitivity and specificity at different cut-off points. The area under the curve (AOC) was 0.95. The recom-

mended cutoff score of ≥16 gave a sensitivity of 84% and specificity of 92%. A score of ≥ 21 is indicative of severe depression, at this score sensitivity was 73.3% and specificity was 96%.

Reliability

The Cronbach's alpha was 0.93 indicating good internal consistency. Cronbach's alpha when an item is removed is a good measure of that item's contribution to the entire test's performance. Cronbach's alpha did not increase when any of the items were removed indicating

that all items contributed to the scale well.

Item-test and item-rest correlation indicates the discriminant ability of an item. Item test and item-rest correlations show that the highest discriminant ability was for items *I felt sad* (0.82)*, I was bothered by things that usually don't bother me* (0.78) *and I could not get "going".* (0.78) (Table 1). The four items that were reverse coded had poor correlation with total scores. The item-rest correlation for these items ranged from 0.06-0.76. The item rest correlation for other items ranged from 0.55-0.82. The average correlation coefficient for the reverse-scored items was 0.35 and the rest of the items 0.63.

Table 1. Item-test and item-rest correlation

	Item-test correlation	Item-rest correlation	Crohnbach's alpha if item removed
Item 1 *I was bothered by things that usually don't bother me.*	0.81	0.78	0.92
Item 2 *I did not feel like eating; my appetite was poor.*	0.73	0.69	0.93
Item 3 *I felt that I could not shake off the blues even with help from my family or friends.*	0.67	0.63	0.93
Item 4 *I felt I was just as good as other people.*	0.13	0.06	0.94
Item 5 *I had trouble keeping my mind on what I was doing.*	0.68	0.64	0.93
Item 6 *I felt depressed.*	0.76	0.71	0.93
Item 7 *I felt that everything I did was an effort.*	0.75	0.71	0.93
Item 8 *I felt hopeful about the future.*	0.24	0.17	0.94
Item 9 *I thought my life had been a failure.*	0.68	0.64	0.93
Item 10 *I felt fearful.*	0.70	0.67	0.93
Item 11 *My sleep was restless.*	0.80	0.77	0.93
Item 12 *I was happy.*	0.79	0.76	0.93
Item 13 *I talked less than usual.*	0.63	0.58	0.93
Item 14 *I felt lonely.*	0.60	0.55	0.93
Item 15 *People were unfriendly.*	0.65	0.60	0.93
Item 16 *I enjoyed life.*	0.48	0.41	0.93
Item 17 *I had crying spells.*	0.67	0.63	0.93
Item 18 *I felt sad.*	0.84	0.82	.92
Item 19 *I felt that people dislike me.*	0.65	0.61	.93
Item 20 *I could not get "going".*	0.80	0.78	.93

Table 2. Principal component analysis, with rotation (Promax with Kaiser Normalization)

	Factor 1	Factor 2	Factor 3	Factor 4
Item 1	.825	-.077	.177	-.044
Item 2	.735	-.031	.192	.108
Item 3	.674	.064	.067	.191
Item 4	.041	.793	.028	.428
Item 5	.684	.071	-.128	.429
Item 6	.765	-.123	.154	.088
Item 7	.761	-.053	-.052	.312
Item 8	.160	.705	.278	-.261
Item 9	.677	.175	-.090	-.112
Item 10	.710	.032	-.229	.239
Item 11	.818	-.149	.217	-.061
Item 12	.789	.071	.083	-.084
Item 13	.634	-.102	.294	-.006
Item 14	.613	-.180	-.197	-.235
Item 15	.653	.064	-.615	-.147
Item 16	.437	.434	.028	-.471
Item 17	.682	-.116	.328	-.095
Item 18	.857	-.139	.159	-.048
Item 19	.661	.072	-.645	-.116
Item 20	.816	.003	.003	-.113

Factor analysis

Principal component analysis was carried out to identify factors. The Kaiser-Meyer-Olkin test (KMO) which is a measure of sampling adequacy was 0.91 and Bartlett's s test of sphericity was highly significant (χ^2=1835.0, df=190, p<0.001).

Only factors with an eigenvalue > 1 were retained. This was compared with factors identified by examining a Cattell' scree plot. The significance level for interpretation of factor loadings was 0.40. Items which loaded on more than one factor were included in the factor for which they had the highest factor-loading score.

The unrotated component matrix identified four factors. Oblique rotation (Promax with Kaiser Normalization) was then carried out (Table 2). In the rotated component matrix, factor 1 explained 46.24% of the variance, factor 2 explained 7.46% of the variance, factor 3 explained 6.8% of the variance and factor 4 explained 5.03% of the variance. Items 1,2,3,5,6,7,9,11,12,13,17,18, 20 loaded on factor 1. Items 10,14,15 and 19 loaded on factor 2. The reverse coded items 8 and 16 loaded on factor 3 and only the reverse coded item 4 loaded on factor 4. Some items which loaded on more than one factor were; item 5 which loaded on factors 1, 2 and 4 items 9,10,14 and 20 which loaded on factors 1 and 2.

Discussion

We examined the validity, reliability and factor structure of the Sinhala translation of the CES-D. We found that the Sinhala version of the CES-D had good validity and reliability. The proposed cutoff score of 16 had a sensitivity of 84% and specificity of 92%. Principal component analysis identified a four factor model.

Total score of 16 on the CES-D indicates mild depression. At this score it had high sensitivity. A score of 22 and above is indicative of severe depression. If this score is used as a cutoff the sensitivity reduces substantially to 73.3% and there is marginal improvement in specificity (96%). When the CES-D is used as a screening instrument a cutoff score of 16 is appropriate because of the high sensitivity.

Items 4 (*I felt that I was just as good as other people*), 8 (*I felt hopeful about the future*), 12 (*I was happy*), and 16 (*I enjoyed life*) are reverse-scored and assess the absence of positive affect. Item analysis showed that the item- rest correlation for these items was lower than for the other items. Previous research show that such items were less internally consistent than non-reversed items and were more weakly associated with total scale scores [13].

In previous studies, the number of factors identified by exploratory and confirmatory factor analyses has varied from one to four. The original model proposed by Radloff included four factors: depressed affect (items 3, 6, 14, 17, 18), reduced positive affect (items 4, 8, 12, 16), somatic complaints (items 1, 2, 5, 7, 11, 20), and interpersonal concerns (items 15, 19) [4].

Factor analysis is helpful in identifying symptom clusters which represent different domains. Factor 1 in our model contained items describing depressive affect as well as somatic complaints. This corresponds to the "depressed affect" and "somatic complaints" in the original model. Items 10 (*I felt fearful*), 14 (*I felt lonely*), 15 (*People were unfriendly*) and 19 (*I felt that people disliked me*) loaded on factor 2. This factor corresponds to the "interpersonal concerns" factor proposed by Radloff [4]. We identified two factors that loaded the reverse scored items. Items 8 and 16 loaded on factor 3 and factor 4 loaded only the reverse scored item 4. These two factors correspond to the "positive affect" factor which loads items 4,8,12 and 16 which was identified by a meta-analysis of factor analytical studies [5].

The main limitation was that the study was conducted among out-patients attending a specialized psychiatry clinic. The reliability of the scale may be lower when used for screening the general population.

Both ICD-10 and DSM IV use similar criteria for diagnosis of depressive disorder [2, 3]. There is evidence that the presentation of depressive disorder may vary across different cultures [14, 15]. However the core symptomatology consisting of low mood and loss of interest/pleasure are the same in all cultures [16]. The Peradeniya Depression Scale is a culturally relevant tool which was developed and validated for screening for depression in Sri Lanka. This scale uses expressions and idioms specific to the culture in Sri Lanka [17]. However the validation of the CES-D for use in Sri Lanka will enable comparisons with studies from other parts of the world.

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