Validation of Bangla generalized anxiety disorder 7 scale among general population

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Summary

Anxiety disorder is the most prevalent mental disorder in Bangladesh according to the estimation of World Health Organization (WHO). Among the anxiety disorders, generalized anxiety disorder (GAD) is most common and morbid one. The generalized anxiety disorder (GAD) 7 scale is widely used, highly sensitive and reliable scale to screen GAD and other anxiety disorder for both primary and clinical settings. Because of scarcity of properly validated Bangla version of GAD 7 screening tool among the general population, this study was aimed to develop such a version. This validation study was conducted in cross-sectional design from September, 2016 to August, 2018 in the department of psychiatry, Sylhet MAG Osmani Medical College Hospital, Sylhet. Adaptation was done as per Beaton et al., 2000 criteria. Total 61 patient aged e"18 years diagnosed as GAD by applying SCID CV and 65 age and sex matched healthy volunteer was taken as sample by purposively. Data was collected by administering written questioner with Bangla version of GAD 7 scale and Depression Anxiety Stress Scale (DASS) 21 Bangla. Convergent validity and discriminant validity was explored using DASS 21 Bangla scale. Data was analyzed using SPSS version 25. The result showed that, the Cronbach's alpha value was excellent (0.90), test-retest and intra-class correlation was also good. Unidimensionality was confirmed, a cut-off point of 9 showed adequate value of sensitivity (85%) and specificity (80%) with area under curve being statistically significant (AUC=0.893-0.973). The scale showed good correlation with DASS 21 anxiety (0.637, p<0.001) and stress subscale (0.576, p<0.001). The metric properties of GAD 7 Bangla, its comparison with DASS 21 Bangla confirmed its cultural adaptation and validation. It would be helpful to identify the GAD in all age range of Bangla speaking people.

Bang J Psychiatry 2020;34(1):3-8

Introduction

Twenty first century has become very stressful to human from the perspective of finance, health, politics and others. All these stresses lead to rise in anxiety disorder. Anxiety and depressive disorder is a growing health problem for last 3 decades and the from 416 million in 1990 to 615 millionin 2013.[1] World Health Organization (WHO) estimated the prevalence of anxiety disorder worldwide is 3.6% amounting 264 million and highest number of population lives in South-East Asian region (63 million). In Bangladesh, the prevalence is 4.4%.[2] GAD is one of the most prevalent anxiety disorders[3] and that is associated with greater risk of suffering from comorbid physical and psychological illness like restlessness, insomnia, headache, tightness of chest, palpitation.[4] People with GAD has worse quality of life among other anxiety disorders.[5] To screen generalized anxiety disorder requires a scale with good psychometric property like the 7 items generalized anxiety disorder (GAD) 7 scale.[6] This tool is worldwide accepted and mostly utilized and can also screenpanic disorder, social anxiety disorder and post-traumaticstress disorder in primary settings.[3] One study used Bangla version of GAD-7, but it was not methodically validated nor its reliability and validity was assessed.[7]

Proper validation of this tool in Bangla language involving general population is required to diagnose anxiety and improve mental health service in our society. So, the aim of this study was to adapt culturally and validate the Bangla version of GAD 7 scale that would be appropriate for all.

Materials and methods

This validation study was done in cross-sectional design in the psychiatry outpatient department of Sylhet MAG Osmani Medical College Hospital, Sylhet, Bangladesh from September, 2016 to August, 2018. Sample was collected purposively and sample

size was calculated by intra-class coefficient.[8] Although 61 sample were appropriate for this study including 10% non-response rate, total 65 GAD patients and 65 healthy volunteer was included in this study to assess the criterion validity. Four patients fall out after 1 week while assessing test-retest reliability. To keep equity in result corresponding 4 matched healthy individuals also deducted from calculation. Before that, the adaptation process was done according to standard procedure of backward and forward translation described by Beaton et al.[9,10] Two independent forward translation was performed by a clinical psychologist and a lay person who were bilingual expert. Consensus between translators on forward translation and it was again translated back into English by two other persons who were proficient at both Bangla and English language. After examining all Bangla and English versions, expert committee finalized the Bangla version of GAD 7. The understandability of this version was checked by 10 students of class six who were 12 years old. This new questionnaire was pretested to 30 adult persons. This final version of GAD 7 Bangla was applied to patients who was diagnosed as GAD using SCID I CV (structured clinical interview for DSM IV axis I disorder clinician version) and SCID RV (structured clinical interview for DSM IV axis I disorder research version), who were 18 year old or more, could read and understand Bangla and who gave informed written consent. Age and sex matched healthy individual was recruited from attendant and healthcare stuffs. SCID was also applied to this group to rule out GAD. Both groups were applied GAD 7 Bangla and DASS 21 Bangla to assess convergent and discriminant validity. To assess test-retest reliability the GAD 7 Bangla was reapplied after 1 week. There were 2 tools used in this study: Bangla version of GAD 7 and Depression Anxiety Stress Scale (DASS) 21 Bangla.[11] The GAD 7 questionnaire was a one-dimensional self-administered scale designed to assess the presence of the symptoms of GAD.[6] This was 4-point likert quartet scale (0=none, 1=many days, 2=more than half of the days, 3=almost every day) that had seven items. The DASS 21 was a self-administered, 21 items scale that could screen depression, anxiety and stress[12] having good internal consistency. It was a 4 point likert type scale (0=did not apply to me at all, 1= applied to me to some degree, or some of the time, 2=applied to me to a considerable degree or a good part of time, 3=applied to me very much or most of the time). It was translated and validated into Bangla language. The study was conducted complying the declaration of Helsinki 1964. The GAD 7 scale was made free for use and translation by the authority (www.phqscreeners.com). Formal permission was taken from the author of Bangla version of DASS 21.[11] The research protocol was approved by ethical committee of Sylhet MAG Osmani Medical College on 16th January 2017. Informed written consent was obtained from the

subjects without any influences. Permission for understand ability test by 12 years old students was taken from the school headmaster. Data was collected anonymously and confidentiality of data was ensured adequately. After proper coding and cleaning, socio-demographic data was analyzed and presented as frequency distribution. Standard method was followed to analyze the psychometric properties.[10] Reliability was assessed by Cronbach's á calculation for internal consistency, a value of e"0.9 was considered excellent[10] and by test-retest reliability using intra-class and Pearson correlation coefficient. Both face and content validity were assessed by standard translation, back translation, expert committee review.[9] Construct validity was assessed by exploratory factor analysis (EFA) of the principal component with varimax rotation. Kaiser-Meyer-Olkin (KMO) measure sampling adequacy and Barlett's test of sphericity was applied to assess the fitness of data for factor analysis. In case of criterion validity, receiver operating characteristic curves were analyzed and sensitivity, specificity rates, positive andnegative predictive values of the questionnaire were calculated when the resulting diagnostic classification was compared to SCID I. In Convergent validity, the degree of concordance between the GAD 7 scale and the DASS 21 anxiety and stress subscale was performed by Pearson's correlation coefficient. Discriminant validity was calculated by Pearson's correlation coefficient to compare between the GAD 7 scale and the DASS 21 depression subscale. Statistical calculation was performed using statistical package for social sciences (SPSS) for windows version 25.

Results

In the current study, the response rate was 93%. Male was 37.7% and female was 62.3%. The mean age (±SD) was 34.56 (±11.79) years in GAD patients and 34.03 (±10.05) years in healthy group, minimum age of the patient was 18 year and maximum age was 60 years. Maximum frequencies (37.7%) were found in 40-60 years range. Most of the patients (37.7%) had academic qualification of primary, followed by graduation/post-graduation (24.6%), higher secondary (23%) andsecondary (14.8%). Most of patients came from nuclear family (60.7%) and most of healthy individuals from extended family (54.1%). Both GAD patients (52.5%) and healthy people (65.6%) were mostly married and lived in urban area (70.49% and 63.90% respectively). Most of the patient was either housewife (37.7%) or businessman/service holder (37.7%), but most of the latter group was service holder (49.2%) (Table 1). Internal consistency of Bangla version of GAD 7 was assessed by Cronbach's alpha. Alpha value was reached the excellent value (0.90). All item showed high item-total correlation (higher than 0.68) (Table 2) and hence no item had been discarded. Test-retest correlation was 0.860 (95% confidence interval between 0.806 and 0.900)

Table 1: Distribution of socio-demographic variables of the respondents (n=122)

Variable	Patient		Healthy	
	Frequency	Percentage	Frequency	Percentage
Gender				
Male	23	37.7	23	37.7
Female	38	62.3	38	62.3
Age in years				
18-29	22	36.1	23	37.7
30-39	16	26.2	21	34.4
40-60	23	37.7	17	27.9
Mean (±SD)	34.56 (±11.79)		34.03 (±10.05)	
Education				
Primary	23	37.7	22	36.1
Secondary	9	14.8	14	23.0
Higher secondary	14	23.0	6	9.8
Graduate/ postgraduate	15	24.6	19	31.1
Family type				
Nuclear family	37	60.7	28	45.9
Extended family	24	39.3	33	54.1
Religion				
Islam	57	93.4	52	85.2
Sanatan	4	6.6	9	14.8
Marital status				
Unmarried	22	36.1	16	26.2
Married	32	52.5	40	65.6
Separated/ widow	7	11.5	5	8.2
Place of living				
Rural	18	29.51	22	36.1
Urban	43	70.49	39	63.90
Income				
<10000	25	41.4	27	44.3
10000-19999	22	36.1	23	37.7
≥20000	12	19.7	11	18.0
Missing	2	3.3		
Occupation				
Housewife	23	37.7	19	31.1
Business/ service	23	37.7	37	60.7
Others	15	24.6	5	8.2

Table 2: Item-total and individual Cronbach's alpha of GAD 7 Bangla

Item	Corrected item total correlation	Cronbach's alpha if item deleted
Item 1	0.743	0.881
Item 2	0.747	0.880
Item 3	0.825	0.872
Item 4	0.717	0.884
Item 5	0.617	0.896
Item 6	0.645	0.892
Item 7	0.658	0.891

measured by intra-class correlation coefficient. Face and content validity were assessed and maintained by systematic development of GAD 7 Bangla with expert committee assessed the all items during back and forth translations.[9,10,13] Construct validity was assessed by EFA of the principal component with varimax rotation. KMO measure sampling adequacy and Barlett's test of sphericity was applied to assess the fitness of data for factor analysis. The KMO was found 0.87 (p<0.001) which was adequate.[10] In the exploratory factor analysis, the communalities of GAD 7 Bangla between the items before and after extraction was above 0.5 in all items and was not needed to drop any item. The first Eigen value was 4.405 covering about 63% of the variances. Then Eigen values dropped markedly, and below 1. It supported the single factor of the scale. All items had positive loadings higher than 0.71 (Table 3) in the single domain and hence Varimax rotation was not possible.

Receiver operating characteristic (ROC) analysis of the GAD 7 showed an area under the curve (AUC) of 0.933 (95% CI 0.893-0.973) which was highly significant (P<0.001). Figure 1 shows the ROC curves for the scores of GAD 7. The cutoff point that

Table 3: Component matrix of GAD 7 Bangla

	Component 1
Item 1	0.825
Item 2	0.833
Item 3	0.887
Item 4	0.803
Item 5	0.711
Item 6	0.730
Item 7	0.749

maximized both sensitivity and specificity was 9. At a cutoff score of 9, the GAD 7 had a sensitivity of 85%, a specificity of 80%, a positive predictive value (PPV) of 81%, and a negative predictive value (NPV) of 84% (Table 4). Convergent validity was assessed by Pearson's r correlation coefficient. The correlation coefficient of GAD 7 and DASS 21 Anxiety subscale was 0.637 (p<0.001). The GAD 7 and DASS 21 Stress subscale correlation coefficient was 0.576 (p<0.001). Both Subscales of DASS 21 showed moderate positive correlation with GAD 7 Bangla (Table 5). In discriminant validity, the Pearson's correlation coefficient of GAD 7 and DASS 21 Depression subscale was 0.281 (p=0.026). It showed weak positive correlation between these two scales (Table 5).

The distributions of total score of items among the patient (mean=13.26, SD=3.306) was significantly higher than healthy group (mean=6.56, SD=3.058). The difference between the groups was also significant (p<0.001) in individual items (Table 6).
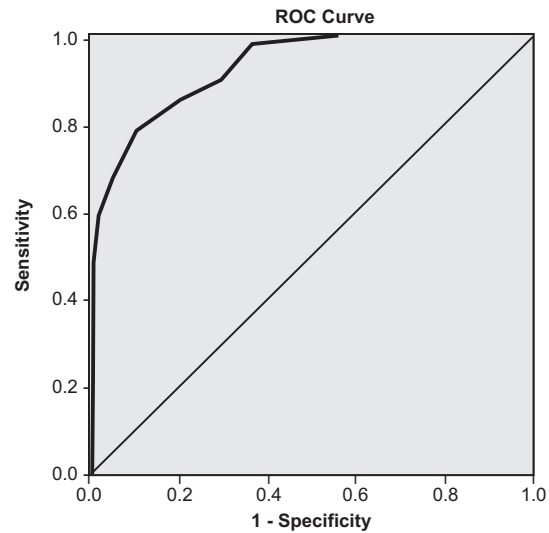

Figure 1: Receiver operating characteristics curve for GAD 7 Bangla

Table 4: Operating characteristics of GAD 7 Bangla for different cut off points (value expressed in percentage)

Cut off	Sensitivity	Specificity	PPV	NPV
>9	85	80	81	84
>10	78	90	89	80
>11	69	95	93	75
>12	59	98.4	97	71

PPV indicated positive predictive value; NPV indicated negative predictive value

Table 5: Correlation between GAD 7 and DASS 21

	GAD 7 total score	DASS anxiety score	DASS stress score	DASS depression score
r	1	0.637**	0.576**	0.281*
Significance	78	<0.001	<0.001	0.029

r indicated Pearson's correlation coefficient, *Correlation was significant at the 0.05 level, **Correlation is significant at the 0.01 level

Table 6: Comparison of GAD 7 items and total scores with the healthy group (n=122)

Item	Patient	Healthy	t	p
	Mean (SD)	Mean (SD)		
Item 1	2.10 (0.68)	1.07 (0.66)	8.571	<0.001
Item 2	1.98 (0.67)	0.79 (0.58)	10.537	<0.001
Item 3	2.13 (0.59)	0.98 (0.56)	10.986	<0.001
Item 4	1.92 (0.67)	1.03 (0.71)	7.123	<0.001
Item 5	1.66 (0.85)	0.95 (0.72)	4.937	<0.001
Item 6	1.79 (0.71)	0.97 (0.61)	6.866	<0.001
Item 7	1.69 (0.79)	0.79 (0.71)	6.649	<0.001
Total	**13.26 (3.306)**	**6.56 (3.058)**	**11.628**	**<0.001**

SD indicated Standard deviation; t indicated Student's t-test; p indicated significant at a level of p value of <0.05

Discussion

The aim of this study was to adapt the GAD 7 Bangla as well as assess its psychometric properties. Internal consistency was excellent (0.90) and was similar to the original GAD 7 (0.92)[6] and French study (0.90),[14] Spanish(0.94),[15] German (0.89)[16] and Chinese (0.89) studies.[17] Test-retest reliability in the form of intra-class correlation coefficient was acceptable (0.860).[10] Validation study showed good similarity among Bangla and studies of other languages. Face validity, content validity were systematically assessed and maintained during the development of the research instrument and at the time of interview by the interview response.[13,18] Construct validity was assessed by EFA of the principal component with varimax rotation and KMO measure of sampling adequacy and Barlett's test of sphericity was applied to the fitness of data for factor analysis. Like the Portuguese study, it was adequate.[19] The scale was developed as one-dimensional structure, all items measuring same concept and in the same direction and matched the original structure. Unidimensionality of GAD 7 was also observed in Spanish[15] and Turkish[20] version. Criterion validity was assessed using operating characteristics (ROC) at cut-off point 9 yielded good sensitivity and specificity and it was in line with original English[6] and Spanish validation study.[15] Convergent validity was assessed by correlation with anxiety and depression subscale of DASS-21 Bangla. It showed good positive correlation with GAD 7 Bangla. GAD 7 Spanish[15] and Portuguese[19] showed good correlation with hospital anxiety and depression scale (HADS) and Hamilton anxiety scale (HAM-A). Discriminant validity was assessed by correlation of GAD 7 Bangla with depression subscale of DASS-21 Bangla and revealed weak positive correlation so as to signify that, it was a screening tool and GAD patients also had symptoms of depression, although both conditions were discernible. Similar weak positive correlation with depression subscale of hospital anxiety and depression scale (HADS) in Portuguese study[19] and in Spanish study, there was rather high correlation.[15] The individual and total item scores were significantly different between the patient and healthy group indicating a good discriminating capacity of the scale. Despite sincere intention and effort, this study, like other study had some limitations. This study was performed in a tertiary hospital north-eastern region of Bangladesh. Better result could have been achieved if it was done at multiple sites and at multiple levels of care to include all existing linguistic variability in the country. Inter-rater reliability and predictive validity could not be assessed due to time and resource constraints.

Conclusion

As anxiety disorder is rising, a good reliable and valid scale that can be used in all population is very much required. So, easily applicable Bangla GAD 7 scale can meet up the need. Bangla validation signified its reliability by achieving high score measured by Cronbach's á and test-retest reliability. Construct validity, criterion validity, convergent validity and discriminant validity also showed the psychometric strength of this scale. This study established that, Bangla version of GAD 7 was valid, and reliable and could be applied in primary and clinical settings to all group of population of Bangladesh.

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