



## Adaptation and Validation of the Bangla Version of the Yale-Brown Obsessive-Compulsive Scale

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### Abstract

Obsessive-Compulsive Disorder (OCD) is the 4th most prevalent psychiatric disorder and 10th most disabling of all medical diseases. The Yale-Brown Obsessive Compulsive Scale (Y-BOCS) is considered as gold standard tool which is widely used to assess the severity and the treatment response of OCD. Aim of this study was to adapt and evaluate psychometric properties of Y-BOCS Bangla. The adaptation was done as per Beaton et al., 2000 criteria. A total of 48 untreated newly diagnosed OCD patients were enrolled. Content validity, face validity, and factor analysis were considered for the assessment of validity. Reliability was assessed considering internal consistency, inter-rater reliability, and test-retest reliability. The Item-level Content Validity Indexes (I-CVIs) were 1 except for item 10 and the Scale-level Content Validity Index (S-CVI) was 0.97. In two factor model, no item had salient loading on more than one factor and there were no items that failed to load on either factor. Communalities were ranged from 0.36 to 0.85. Cronbach's alpha value for Y-BOCS Bangla total, obsessions subscale and compulsions subscale were 0.76, 0.78, and 0.79 respectively. The range of Intraclass Correlation Coefficient (ICC) for inter-rater reliability was from 0.90 to 0.99 and Cohen's Kappa was 0.904. ICCs for test-retest reliability were ranged from 0.76 to 0.99. All values represented that the Y-BOCS Bangla was a valid and reliable scale.

**Keywords:** Obsessive Compulsive Disorder (OCD); Yale-Brown Obsessive Compulsive Scale (Y-BOCS); Adaptation; Validation; Validity; Reliability

### Introduction

Obsessive-Compulsive Disorder (OCD) is a frequent and disabling psychiatric condition. As per the definition provided by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000), OCD is the "presence of obsessions and/or compulsions that are severe enough to be time-consuming or causes marked distress or significant impairment" [1]. OCD is the 4th most prevalent psychiatric disorder in Epidemiological Catchment Area (ECA) Survey and the 10th most disabling of all medical diseases in an early burden of disease study [2]. In the USA, the prevalence of OCD is 2.1% each year [3]. As part of the cross-country collaboration, studies have been conducted in different countries,

including Canada, Germany, Taiwan, New Zealand, and Korea using the ECA tool. The lifetime prevalence (1.9-2.5%) and annual prevalence (1.1-1.8%) of OCD are consistent across the countries except Taiwan [4,5]. There is very limited evidence on OCD in Bangladesh. However, the prevalence of OCD in Bangladesh was 0.5% as per a study conducted in 2006 [6].

OCD is associated with reduced quality of life as well as highly impaired social and occupational life. Impairment occurs across many different aspects of life and is often associated with the severity of symptoms. Suicidal thoughts occur at some point in as many as about 50% of individuals with OCD. Suicidal attempts are also reported in up to 25% of individual with OCD [7].

Rating scales are used in psychiatry mainly for assessing symptoms, to record changes, either spontaneous or following intervention, and for screening purposes [8]. The Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) is the most widely used tool which is clinician-rated and accepted as the "gold standard" in measuring the severity of symptoms of OCD and response to the treatment [9]. The Y-BOCS has two distinctive parts: The Yale-Brown Obsessive Compulsive Scale-Symptoms Checklist (Y-BOCS-SC) and The Yale-Brown Obsessive Compulsive Scale-Severity Scale (Y-BOCS-SS). The Y-BOCS-SC is used to evaluate the presence of current and past symptoms. It is consisted of 60 identified OCD symptoms across 15 categories of obsessions and compulsions where a dichotomous rating is used to indicate the presence or absence of a particular symptom. Y-BOCS-SS is used for assessing the severity of symptoms consists of 10-items. The first 5 items are about obsessive thoughts which measure the time, interference with normal functioning, subjective distress, resistance by the patient, and the degree of control of obsessive thoughts. The rest of the 5 items are identical to the first half and measure the compulsions. Each item is rated from 0 to 4 where 0 denotes no symptoms and 4 denotes severe symptoms. The total Y-BOCS scores ranged from 0 to 40 which is the sum of the rating of each item. The severity of obsession and compulsion is presented demonstrating a separate subtotal for the respective sections [10,11].

Apart from the Y-BOCS, there are several other instruments that have been developed to measure the severity of symptoms and the treatment response in patients with OCD. The other instruments include the Leyton Obsessive Inventory, the Maudsley Obsessional Compulsive Inventory, the Obsessive-Compulsive Subscale of the Comprehensive Psychopathological Rating Scale, the National Institutes of Mental Health Global Obsessive Compulsive Scale, etc. However, the Y-BOCS is considered as the gold standard among all the instruments [12,13].

Since its introduction in 1986, the Y-BOCS is globally accepted and used. It has been translated and validated into more than 20 languages including Korean, French, Chinese, Brazilian, Portuguese, Japanese, and Turkish. There is still no validated instrument to measure symptoms severity and treatment response in Bangladesh with a population is about 157 million which is projected to 250 million by 2050 [14]. Bangla is the state language of this country. More than 230 million people use it as their first language in the world. It is ranked 7th in the world in terms of the number of people who speak in Bangla [15]. Our study aimed to adapt and validate the Bangla version of the Y-BOCS among Obsessive-Compulsive Disorder patients in Bangladesh.

## Materials and Methods

This cross-sectional study was conducted in the department of psychiatry of Bangabandhu Sheikh Mujib Medical University. The study period was from January 2014 to June 2015. Cross-cultural adaptation of Y-BOCS was done as per Beaton et al., 2000 criteria [16]. English version of Y-BOCS was translated into Bangla by two persons having competency in both Bangla and English. The first one (T1) by a psychiatrist and the second one (T2) by a non-medical person. These two translations were synthesized into one translation (T-12). Any discrepancies in the report of translations were resolved. Then, the T-12 version was translated back to the original English version by the previous translators. An expert committee (4 psychiatrists, 2 translators, and a language professional) reviewed all the reports and produced a pre-final version. The final version was produced after pre-testing and approved by the expert committee. In this study, a total of adult Bangla speaking 48 newly diagnosed untreated OCD patients were enrolled. Purposive and consecutive sampling technique was applied. The Structured Clinical Interview for DSM-IV Axis-I Disorders–Clinician Version (SCID-CV) was used to diagnose Obsessive Compulsive Disorder based on DSM-IV-TR criteria. Although the sample size was 46, considering 10% dropout in test-retest reliability, 51 patients were enrolled. Three patients did not come after two weeks in test-retest reliability and were excluded from the study. So, the response rate was 94%. A semi-structured questionnaire was applied to the patients to collect socio-demographic informations. Then, the Y-BOCS Bangla version was applied by two researchers as rater-1 and rater-2 and remain blind to each other for inter-rater reliability. The scale was reapplied after two weeks interval by rater-1 for the test-retest reliability. Content validity, face validity, and factor analysis were conducted to assess the validity. Reliability was assessed in the form of internal consistency, inter-rater reliability, and test-retest reliability.

The Item-level Content Validity Index (I-CVI) and the Scale-level Content Validity Index (S-CVI) were the main considerations while assessing content validity. Three psychiatrists were engaged in assessing the content validity indices. Each item was rated either 1 (not relevant), 2 (somewhat relevant), 3 (quite relevant), or 4 (highly relevant) by the individual experts independently. The I-CVI was calculated for each item where the number of experts giving a rating of either 3 or 4 was divided by the total number of experts. Thus, the ordinal scale was dichotomized as relevant and non-relevant. The S-CVI was measured considering the average of the I-CVIs for all items on the scale. Content validity of the scale was judged as excellent if the I-CVI=1 for each item and the S-CVI/Average  $\geq$  0.9 [17]. Six members expert committee reviewed the Bangla version of Y-BOCS. Each member of the panel was a psychiatrist having competency in both Bangla and English. They provided an expert opinion regarding the face validity of the content. The scores of individual items of the Bangla version of the Y-BOCS were recorded and the interrelationships among those scores were analyzed by factor analysis to assess factorial validity. Exploratory factor analysis was done.

Reliability refers to the reproducibility or consistency of scores from one assessment to another [18]. Reliability assessment can be done by inter-rater reliability, test-retest reliability, internal consistency, split-halves reliability. In this study, inter-rater reliability, test-retest reliability and internal consistency were assessed. The researcher assessed Cronbach's alpha to find out internal consistency. To assess Inter-rater reliability, Y-BOCS was rated by two researchers. This was analyzed in the form of the Kappa coefficient and

Spearman's rank correlation test. For evaluating test-retest reliability, one researcher assessed the respondents again during their follow-up in 14 days. A clinically useful effect was not to be reached until about 6 weeks of treatment [19]. So, initiation of treatment was not significantly changed the intensity of symptoms within this short duration. Spearman's rank correlation test was done for this.

## Data analysis

Data were analyzed using the Statistical Package for Social Science (SPSS), version-23. Statistical analysis was conducted to generate frequencies and percentages, Spearman's rank correlation test, Kappa coefficient, Intra-class correlation coefficient where applicable. All statistical tests were two-tailed and  $p < 0.001$  was considered statistically significant.

## Results

### Sample characteristics

A total of 48 newly diagnosed OCD patients were enrolled in the study. Age ranged from 18 to 55 years. Out of 48 OCD patients, there were 31 (64.6%) male and 17 (35.4%) female. The male to female ratio was 1.82:1. Table 1 shows that 25 (52.1%) patients were unmarried and 23 (47.9%) patients were married. Most of the patients *i.e.* 95.83% came from a nuclear family. It was found that 21 (43.8%) patients came from an urban background. There were 43 (89.6%) Muslim patients and 5 (10.4%) Hindu patients.

Socio-demographic characteristics of the study population (n=48)		
Characteristics	No. of patients	Percentage (%)
Age (Years)		
18-20	6	12.5
21-30	27	56.2
31-40	11	23
41-50	3	6.2
$\geq$ 50	1	2.1
Range (18-55) years		
Sex		
Male	31	64.6
Female	17	35.4
Male : Female ratio	1.82:1	
Marital status		
Unmarried	25	52.1
Married	23	47.9
Family status		
Nuclear	46	95.83
Joint	2	4.17
Residence		

Urban	21	43.8
Rural	27	56.3
Religion		
Muslim	43	89.6
Hindu	5	10.4
Level of education		
Illiterate	1	2.1
Primary	5	10.4
Secondary	14	29.2
Higher secondary	19	39.6
Graduate and above	9	18.8
Occupation		
Unemployed	5	10.4
Student	17	35.4
Housewife	12	25
Farmer	1	2.1
Businessman	1	2.1
Service	12	25

**Table 1:** Socio-demographic characteristics of the study population (n=48).

## Validity

### Content validity

The result of content validity demonstrates that all the items had excellent content validity except item number 10. The I-CVI of item 10 was 0.66. The value of the Scale-level Content Validity Index (S-CVI) was 0.97.

### Face validity

The expert committee reviewed the Y-BOCS Bangla and they agreed upon the following parameters: understandable and sensible design, acceptable surface appearance, appreciable implication, the capability of the items to measure what it was meant to be measured.

### Factor analysis

Ten items of Y-BOCS Bangla were explained by a two-factor model. The first factor consisted of 6 items with salient loadings (>0.40) and assessed the time, interference, and distress associated with obsessions and compulsions. This factor was termed as “severity”. The second factor consisted of 4 items and assessed the degree of resistance and control associated with obsessions and compulsions. This factor was termed as “Resistance/control”. There was an adequate number of items (*i.e.* 4 or more) in each factor with loading above 0.40 [20]. No item had salient loading on more than one factor and there were no items that failed to load on either factor.

The term “communality” for a given variable can be interpreted “as the proportion of variation in that variable explained by the two factors”. For example, communality=0.67 reflects that 67% of the variation in a specific item is explained by the factor model. The communality of items 4, 5, 8, and 10 was slightly below the expected level (Table 2).

Factor analysis* of the Y-BOCS Bangla			
Items of Y-BOCS Bangla	Factor I	Factor II	Communalities(h <sup>2</sup> )
Item-1	0.676	- 0.461	0.67
Item-2	0.776	- 0.368	0.74
Item-3	0.683	- 0.594	0.82
Item-4	0.304	0.678	0.55
Item-5	0.205	0.562	0.36
Item-6	0.875	0.283	0.85
Item-7	0.850	0.223	0.77
Item-8	0.738	- 0.035	0.55
Item-9	0.300	0.815	0.75
Item-10	0.338	0.588	0.46

**Table 2:** Factor analysis\* of the Y-BOCS Bangla.

\*Based on first ratings of rater-1

Note: Factor loading  $\geq 0.40$  are listed in boldface type.

## Reliability

### Internal consistency

Cronbach’s alpha and item-total correlation were calculated from various permutations of the Y-BOCS Bangla. The internal consistency score for the Y-BOCS Bangla total was 0.76. Cronbach’s alpha of obsessions subscale was 0.78 and compulsions subscale was 0.79. All obsessions items were strongly correlated with the obsessions subscale except resistance and control items. The correlation coefficient of the resistance item was 0.19 which was weakly correlated and the control item was 0.64 which was moderately correlated with the obsessions subscale. Among the items of the compulsions subscale, only the resistance item was moderately correlated ( $r=0.51$ ) and the rest of the items were strongly correlated.

Again, when the association between 10 items and total Y-BOCS Bangla were examined, it was observed that the resistance item of both obsessions and compulsions ( $r=0.31$  and  $0.31$  respectively) subscale were weakly correlated. The control items of both obsessions and compulsions subscale were moderately correlated ( $r=0.63$  and  $0.62$ ). Rest of the items were strongly correlated with each other (Table 3).

Internal consistency			Inter-rater reliability	Test-retest reliability
	Item-reminder correlation (Subscale)	Item reminder correlation(Y-BOCS Bangla total)	Inter-rater ICCs	Test-retest ICCs
Obsessions Subscale	alpha=0.78		0.96	0.95
Item-1	0.86	0.67	0.99	0.98
Item-2	0.89	0.76	0.94	0.76
Item-3	0.83	0.68	0.91	0.81
Item-4	0.19	0.31	0.99	0.99
Item-5	0.64	0.63	0.90	0.92
Compulsions subscale	alpha=0.79		0.97	0.96
Item-6	0.90	0.86	0.98	0.98
Item-7	0.89	0.83	0.90	0.77
Item-8	0.77	0.72	0.95	0.76
Item-9	0.51	0.31	0.94	0.94
Item-10	0.75	0.62	0.96	0.92
Y-BOCS Bangla Total	alpha=0.76		0.97	0.96

**Table 3:** Internal consistency.

### Inter-rater reliability

Evidence of inter-rater reliability was examined by using Intra-class Correlation Coefficients (ICCs). Table 3 shows that reliability was good between rater 1 and rater 2 for Y-BOCS Bangla total and the two subscales and also for every 10 items. The range of intra-class correlation coefficient was between 0.90 to 0.99 which represented a very strong positive correlation. The Spearman's rho and Pearson's r were 0.973 and 0.87 respectively which demonstrated a strong positive correlation between independent raters. In addition, Inter-rater correlation was statistically significant ( $p < 0.001$ ). The Cohen's Kappa coefficient was 0.904 which reflected that inter-rater agreement was almost perfect. This agreement was statistically significant as well ( $p < 0.001$ ) (Table 4).

Correlation of inter-rater reliability		
Item	Value	P-value
Spearman's rho	0.973	<0.001
Pearson's r	0.87	<0.001
Cohen's kappa	0.904	<0.001

**Table 4:** Correlation of inter-rater reliability.

### Test-retest reliability

The test-retest reliability was assessed using the Intra-class Correlation Coefficients (ICCs). Table 3 shows that test-retest reliability was good between the ratings of the respondents at two

weeks intervals. The intra-class correlation coefficient was ranged from 0.76 to 0.99 for the total Y-BOCS Bangla scale, the subscales for obsessions and compulsions, and all the individuals 10 items. ICCs of Y-BOCS Bangla total and subscales were good. ICCs of most of the individual items were good except items 7 (ICC=0.77) and 8 (ICC=0.76). Data represented that test-retest ratings were strongly associated and not affected by the treatment or 2 weeks duration of the inter-test interval. The correlation coefficient of test-retest reliability was 0.960 which demonstrated the strong positive correlation of the consecutive two ratings of the first rater. The correlation coefficient was statistically significant ( $p < 0.001$ ).

### Discussion

In this study, most of the newly diagnosed patients (56.2%) were within the age range of 21-30 years. This finding is consistent with the study carried out by Rasmussen and Eisen where the onset of age for males was  $19 \pm 9.2$  years and for females was  $22 \pm 9.8$  years [21]. The male-female ratio was 1.82:1 where 64.6% were male and 35.4% were female. According to Gelder et al. males and females are equally affected with a slight female predominance [22]. This discordance can be explained by the purposive sampling technique of this study. Among the 48 OCD patients, 27 (56.3%) came from a rural background and 21 (43.8%) from an urban background and most of the patients (95.8%) came from a nuclear family. There were (47.9%) married and 25 (52.1%) unmarried OCD patients in the study population. Pato et al., pointed out that the probability of partial and full remission significantly increases by marriage [23].

In our study, the content validity was assessed according to Polit and Beck method. The result showed that all items had a good item-level content validity index (I-CVI) except item 10. The I-CVI of item 10 was 0.66. Scale level content validity index (S-CVI) was 0.97. As per the method of Polit and Beck having I-CVI=1 for each item and S-CVI  $\geq 0.9$  can be judged as excellent content validity. So, the content validity of Y-BOCS Bangla was excellent as both I-CVI and S-CVI were within the expected level. Goodman et al. also showed that Y-BOCS had excellent content validity but that was assessed by 1) DSM- III criteria for OCD; 2) review of other rating scales and; 3) the extensive clinical experience of the authors with patients with OCD. Face validity was judged by six members expert committee. They agreed with each other that the face validity of Y-BOCS Bangla was good. According to the criteria of factor analysis, each factor considered in the current study demonstrated stability. A similar approach was followed by Deacon et al. That study also used two-factor analysis methods and reported similar results. However, the communalities were different from our study despite having similarities in item loading. In our study, communalities were low in items 4, 5, 8, and 10, whereas communalities were low in items 3, 4, and 8 in Deacon et al. study. The validation study conducted by Goodman et al., did not consider factor analysis.

The present study showed internal consistency for the Y-BOCS total ( $\alpha = 0.76$ ), obsessions subscale ( $\alpha = 0.78$ ) and compulsions subscale ( $\alpha = 0.79$ ) were acceptable. All obsessions items were strongly correlated with the obsessions subscale except resistance and control items. Among the items of the compulsions subscale, only the resistance item was moderately correlated and the rest of the items were strongly correlated. Goodman et al. found that the  $\alpha$  coefficients were as follows:  $\alpha = 0.90$  for rater 1,  $\alpha = 0.88$  for rater 2,  $\alpha = 0.90$  for rater 3 and  $\alpha = 0.91$  for rater 4; and the mean of all raters was  $\alpha = 0.89$  ( $p < 0.001$ ). So, the Cronbach's  $\alpha$  of this study was slightly below than

Goodman et al. study. In Woody et al.,  $\alpha$  were 0.69, 0.77, and 0.51 for Y-BOCS total, obsessions subscale, and compulsions subscale respectively. This study was consistent with the study by Woody et al. except in the compulsions subscale. The present study found excellent inter-rater reliability which was assessed by Intra-class Correlation Coefficients (ICCs). Reliability was excellent between rater 1 and 2 as the ICCs were as follows: Y-BOCS Bangla total  $r=0.97$ , Obsessions subscale  $r=0.96$ , Compulsions subscale  $r=0.97$ , items  $r=0.90-0.99$ . Kappa coefficient was 0.904 ( $p<0.001$ ) which reflected that inter-rater agreement was high. The correlation coefficient of rater 1 and 2 was 0.973 which was also strongly positive and statistically significant ( $p<0.001$ ). These findings were in agreement with Goodman et al. study where ICCs for Y-BOCS total  $r=0.98$ , Obsessions subscale  $r=0.97$ , Compulsions subscale  $r=0.96$  and items  $r=0.86-0.97$ . Similar findings were also observed in Woody et al. study where they found Y-BOCS total  $r=0.93$ , Obsessions subscale  $r=0.94$ , Compulsions subscale  $r=0.89$ , and items  $r=0.76-0.91$  [24].

This study also found excellent test-retest reliability. The Intra-class Correlation Coefficients (ICCs) were ranged from 0.76 to 0.99 for Bangla Y-BOCS. ICCs of the individual items were excellent except item 2 ( $r=0.76$ ), 7 ( $r=0.77$ ) and 8 ( $r=0.76$ ). Other ICCs were also excellent such as the Y-BOCS total  $r=0.96$ , Obsessions subscale  $r=0.95$ , Compulsions subscale  $r=0.96$ . The correlation coefficient of test-retest reliability was 0.960 which was also strongly positive and statistically significant ( $p<0.001$ ) In Woody et al. the scores for Y-BOCS total ( $r=0.61$ ), Obsessions subscale ( $r=0.64$ ), and compulsions subscale ( $r=0.56$ ) provided less reliable results than desirable. However, given the possibility of change in raters and the lengthy duration of the inter-test interval, the findings were acceptable. These findings suggested that ICCs of this study were higher than that of Woody et al. which was desirable.

## Conclusion

This was the first study in Bangladesh to explore the psychometric properties of the gold standard Yale-Brown Obsessive-Compulsive Scale. The findings of this study revealed that the validity and reliability of the Bangla version of the Yale-Brown obsessive compulsive scale were high and very acceptable. It is useful for use in future studies. However, "Resistance" and "Control" items were ambiguous to each other. They need modification and clarification for further structural change of Y-BOCS. We can conclude that this Bangla version of the Yale-Brown Obsessive Compulsive Scale is a valid and reliable scale in assessing symptoms severity and treatment response among patients with Obsessive Compulsive Disorder in Bangladesh context and can reduce the huge burden of this distressing disorder.

## Ethical Issue

The ethical clearance was obtained from the Institutional Review Board of the Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh.

## Conflict of Interest

Authors have no conflict of interest.

Investigators interested in using this rating scale should contact Dr. Monirul Islam at Department of Psychiatry, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh.

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