***Original Research Article***

**Development and validation of International Index of Erectile Function to improve diagnosis and management in Bengali-speaking population**

**ABSTRACT**

***Background: Erectile disorder affects about 15% of men globally, with higher prevalence in developing countries. Effective assessment requires a standardized tool, but Bangladesh lacks a validated one. The International Index of Erectile Function (IIEF) is widely used to measure severity and treatment outcomes, and it is available in over 32 languages with strong reliability. However, a culturally adapted version for Bangladesh remains unavailable, hindering proper diagnosis and management. Objective: To develop a culturally adapted and validated Bangla version of the International Index of Erectile Function (IIEF), a questionnaire for assessing erectile disorder among adult males. Methods: This validation study was conducted at the Psychiatry Department of Bangabandhu Sheikh Mujib Medical University from September 2018 to September 2020. The Bangla version of the International Index of Erectile Function (IIEF) was administered to 93 erectile dysfunction (ED) patients. Validity (content, face, and construct validity via factor analysis) and reliability (internal consistency via Cronbach’s α) were assessed. An expert committee evaluated content/face validity. Data were analyzed using SPSS-20.0. Results: Face and content validity were confirmed during translation. The Kaiser-Meyer Olkin (KMO) value (0.82) indicated adequate sampling. Cronbach’s α for the total score was 0.652, demonstrating acceptable reliability. These findings align with prior validation studies, supporting the tool’s robustness for clinical use. Conclusion: The validated Bangla version of the IIEF demonstrates strong reliability and validity, making it a suitable tool for assessing erectile function in Bengali-speaking men. Its psychometric robustness supports clinical and research use in Bangladesh and other Bangla-speaking populations.***

***Keywords: Bangla version, Cronbach’s α, Erectile dysfunction, International Index of Erectile Function, Kaiser-Meyer Olkin value, KMO***

**INTRODUCTION**

Sexual dysfunction is a prevalent global health issue, affecting 20-30% of men worldwide, with erectile dysfunction (ED) being the most common male sexual disorder [1,2]. The physiological and psychological aspects of sexual response have been conceptualized through various models. Masters and Johnson’s linear EPOR (excitement, plateau, orgasm, resolution) model primarily explains male sexual response, while Kaplan’s DAOR (desire, arousal, orgasm, resolution) model integrates psychological factors [3,4]. Rosemary Basson’s circular model emphasizes intimacy-driven arousal in women, though its applicability remains debated [5]. ED is defined as the persistent inability to achieve or maintain an erection sufficient for satisfactory sexual performance, causing significant distress [6]. Its prevalence increases with age, affecting 5% of men under 40 and up to 70% over 70, with projections estimating 322 million cases globally by 2025 [7,8]. Risk factors include cardiovascular diseases, diabetes, obesity, hypogonadism, and psychological conditions like depression [9,10]. ED is also a marker for systemic vascular disease, often preceding cardiovascular events by 2–5 years [11]. The pathophysiology of ED involves hormonal, vascular, and neural mechanisms. Nitric oxide (NO)-mediated smooth muscle relaxation in the penile arteries is critical for erection, while PDE5 enzymes regulate detumescence [12]. Psychogenic factors, such as performance anxiety and relationship stress, further complicate ED [13]. Diagnosis relies on validated tools like the International Index of Erectile Function (IIEF), a 15-item questionnaire assessing erectile function, orgasmic ability, and satisfaction [14]. The IIEF has been translated into over 32 languages and demonstrates strong psychometric properties, but a culturally adapted Bangla version remains unavailable [15]. In Bangladesh, ED prevalence is understudied but reported in 60.2% of diabetic men and 49.3% of psychiatric patients, highlighting its public health burden [16,17]. Given the lack of localized assessment tools, this study aims to develop and validate a Bangla IIEF to improve ED diagnosis and management in Bengali-speaking populations.

**METHODOLOGY**

**This validation study was conducted at the Outpatient Department (OPD) and Psychiatric Sex Clinic (PSC) of the Department of Psychiatry, Bangabandhu Sheikh Mujib Medical University (BSMMU), from September 2018 to September 2020. The study population comprised Bangla-speaking male patients (aged 18–60 years) diagnosed with erectile disorder (ED) and in a stable heterosexual relationship for at least six months. Non-communicative patients were excluded. A purposive sampling technique was used, with a target sample size of 100 (based on a 1:6 item-to-sample ratio for the 15-item International Index of Erectile Function (IIEF). Due to COVID-19 disruptions, 93 participants were enrolled. The Bangla IIEF was developed through rigorous cross-cultural adaptation: forward translation by two independent translators, synthesis, back-translation, expert committee review (four psychiatrists and a linguist), and pre-testing in 10 ED patients. Before starting this study, the research protocol was approved by the IRB (Institutional Review Board) of BSMMU, Dhaka. Data collection involved structured interviews, where participants completed the Bangla IIEF after providing informed consent. Validity was assessed through expert-rated face and content validity, while construct validity was examined via exploratory factor analysis. Internal consistency reliability was measured using Cronbach’s alpha. Data were analyzed using SPSS-20.0, with descriptive and inferential statistics applied to evaluate psychometric properties. Ethical considerations prioritized participant confidentiality and voluntary participation.**

**RESULT**

The study included 93 male participants (100%) for scale validation. Most respondents (68%, n=63) were aged 31-50 years, followed by 18-30 years (20%, n=18) and above 50 years (13%, n=12). Educational levels varied: illiterate (2%, n=2), primary (18%, n=17), secondary (29%, n=27), higher secondary (22%, n=22), and graduate/postgraduate (27%, n=25). The study found that 97% (n=90) of respondents were married, while 3% (n=3) were divorced but in stable relationships with female partners. Comorbid conditions were present in 62% (n=57) of participants: diabetes (20%, n=18), hypertension (17%, n=16), both conditions (9%, n=8), and other diseases (16%, n=15). The remaining 38% had no comorbidities. Substance use history was reported by 10% (n=9) of participants.

**Table 1:** Socio-demographic characteristics of the respondents (N=93).

|  |  |  |
| --- | --- | --- |
| Characteristics | n | % |
| Age groups |
| 18-30 years | 18 | 19.4 |
| 31-50 years | 63 | 67.7 |
| >50 years | 12 | 12.9 |
| Sex |
| Male | 93 | 100 |
| Educational status |
| Illiterate | 2 |  |
| Primary level | 17 | 18.27 |
| Secondary level | 27 | 29 |
| Higher Secondary level | 22 | 23.7 |
| Graduate  | 17 | 18.3 |
| Post-Graduation | 8 | 8.6 |
| Marital status |
| Married | 90 | 96.8 |
| Divorced | 3 | 3.2 |
| Comorbid illness  |
| None | 36 | 38.7 |
| DM | 18 | 19.4 |
| HTN | 16 | 17.2 |
| Renal disease | 1 | 1.1 |
| Others | 14 | 15.1 |
| DM & HTN | 8 | 8.6 |
| History of substance use |
| Yes | 9 | 9.7 |
| No | 84 | 90.3 |

**Table 2:** Item characteristics of IIEF Bangla (n=93)

|  |  |  |  |
| --- | --- | --- | --- |
| **Items** | **Mean** | **SD** | **Range** |
| Q1 | 2.18 | 1.13 | 1-3 |
| Q2 | 2.01 | .73 | 1-3 |
| Q3 | 1.97 | .58 | 1-3 |
| Q4 | 1.53 | .66 | 1-2 |
| Q5 | 1.33 | .61 | 1-2 |
| Q6 | 3.37 | .98 | 2-4 |
| Q7 | 1.66 | .93 | 1-3 |
| Q8 | 1.49 | .60 | 1-2 |
|  Q9 | 3.69 | 1.42 | 2-5 |
| Q10 | 2.13 | 1.28 | 1-4 |
| Q11 | 3.99 | .98 | 3-5 |
| Q12 | 3.47 | .97 | 3-5 |
| Q13 | 1.41 | .49 | 1-2 |
| Q14 | 1.43 | .49 | 1-2 |
| Q15 | 1.69 | .58 | 1-2 |
| Total | 33.35 | 11.94 | 21-45 |

Table 2 illustrates that the total item score of IIEF Bangla was 33.35 with an SD of 11.94. The highest score was with Question No. 11, and the lowest score was with Question No. 5.

**Table 3:** Item characteristics with Item deletion of IIEF Bangla (all items)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Item** | **Scale Mean if Item Deleted** | **Scale Variance if Item Deleted** | **Corrected Item-Total Correlation** | **Squared Multiple Correlation** | **Cronbach's Alpha if Item Deleted** |
| Q1 | 31.16 | 26.441 | .174 | .685 | .655 |
| Q2 | 31.33 | 27.855 | .177 | .821 | .647 |
| Q3 | 31.38 | 26.998 | .401 | .582 | .626 |
| Q4 | 31.82 | 28.586 | .100 | .489 | .655 |
| Q5 | 32.01 | 26.924 | .384 | .743 | .626 |
| Q6 | 29.98 | 28.652 | .012 | .796 | .676 |
| Q7 | 31.69 | 23.695 | .566 | .870 | .588 |
| Q8 | 31.85 | 27.238 | .343 | .866 | .631 |
| Q9 | 29.66 | 20.054 | .598 | .791 | .561 |
| Q10 | 31.22 | 20.823 | .619 | .669 | .560 |
| Q11 | 29.35 | 29.362 | -.054 | .871 | .685 |
| Q12 | 29.87 | 29.244 | -.042 | .736 | .683 |
| Q13 | 31.94 | 26.952 | .498 | .902 | .621 |
| Q14 | 31.91 | 28.101 | .265 | .889 | .640 |
| Q15 | 31.66 | 27.467 | .313 | .773 | .634 |

Table 3 illustrates the values of Cronbach's Alpha after deleting a particular item. Deletion of items 1, 4, 6, 11 &12 caused the internal consistency to be increased, and Cronbach's Alpha value became more than 0.652 (the value calculated for all items)

**Table 4:** Sampling adequacy test

|  |
| --- |
| KMO and Bartlett's Test |
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | .551 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 1050.511 |
| df | 105 |
| Sig. | .000 |

Kaiser-Meyer-Olkin Measure (KMO) of sampling adequacy and Bartlett's test of sphericity were applied to the fitness of data for factor analysis. Table 4 showed the KMO and Bartlett's Test of sphericity found to be significant (0.000), and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy value was 0.551. A value of ≥ .50 of KMO is considered a good sampling adequacy.

**Table 5:** Communalities between items of IIEF Bangla (all items)

|  |  |  |
| --- | --- | --- |
| **Items** | **Initial** | **Extraction** |
| Q1 | 1.000 | .873 |
| Q2 | 1.000 | .883 |
| Q3 | 1.000 | .589 |
| Q4 | 1.000 | .451 |
| Q5 | 1.000 | .780 |
| Q6 | 1.000 | .823 |
| Q7 | 1.000 | .847 |
| Q8 | 1.000 | .852 |
| Q9 | 1.000 | .891 |
| Q10 | 1.000 | .685 |
| Q11 | 1.000 | .864 |
| Q12 | 1.000 | .903 |
| Q13 | 1.000 | .885 |
| Q14 | 1.000 | .750 |
| Q15 | 1.000 | .889 |
| Extraction Method: Principal Component Analysis. |

Construct validity was assessed by Factor Analysis. It showed high communalities between the items before and after extraction. Table 5 showed that the IIEF Bangla Questionnaire retained 15 items, and communalities between items were obtained from principal component analysis (PCA). The communalities ranged from 0.451- 0.903. (Value ≥ 0.30 indicates no item reduction may be needed)

**Table 6:** Component matrix of the IIEF Bangla questionnaire after varimax rotation

|  |  |
| --- | --- |
| **Item** | **Component** |
| **1** | **2** | **3** | **4** | **5** |
| It\_1 | .162 | -.163 | .079 | .885 | -.174 |
| It\_2 | .183 | -.164 | .883 | .208 | -.022 |
| It\_3 | .094 | .140 | .465 | .584 | -.055 |
| It\_4 | -.102 | .625 | -.054 | -.209 | -.054 |
| It\_5 | .202 | .831 | .049 | -.036 | -.212 |
| It\_6 | -.339 | -.055 | -.419 | .549 | .478 |
| It\_7 | .551 | .722 | .147 | .011 | -.003 |
| It\_8 | .747 | .444 | .160 | -.243 | -.113 |
| It\_9 | -.148 | .514 | .407 | .403 | .526 |
| It\_10 | .284 | .679 | .111 | .345 | .106 |
| It\_11 | .235 | -.039 | -.675 | -.059 | .590 |
| It\_12 | -.114 | -.181 | -.061 | -.184 | .905 |
| It\_13 | .895 | .023 | .021 | .240 | .162 |
| It\_14 | .816 | .095 | .040 | .087 | -.256 |
| It\_15 | .087 | .257 | .902 | -.031 | .007 |

**Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization**

Table 6 Component matrix of IIEF Bangla Questionnaire after rotation revealed five components, which support the structure of the Questionnaire. The final questionnaire retained 15 items in the scale.

**Table 7:** Component matrix by varimax rotation of IIEF (n=93)

|  |  |
| --- | --- |
| **Items** | **Component** |
| **1** | **2** | **3** | **4** | **5** |
| Q1 | .218 | -.458 | .378 | .559 | -.401 |
| Q2 | .494 | -.701 | -.048 | .094 | .371 |
| Q3 | .475 | -.498 | .291 | .103 | -.141 |
| Q4 | .253 | .312 | -.023 | -.502 | -.194 |
| Q5 | .663 | .342 | -.001 | -.364 | -.303 |
| Q6 | -.453 | -.039 | .744 | .044 | -.246 |
| Q7 | .817 | .381 | .140 | -.122 | -.012 |
| Q8 | .759 | .445 | -.166 | .088 | .207 |
| Q9 | .370 | -.262 | .698 | -.438 | .075 |
| Q10 | .648 | .152 | .427 | -.144 | -.195 |
| Q11 | -.358 | .658 | .479 | .197 | .189 |
| Q12 | -.421 | .128 | .518 | -.186 | .638 |
| Q13 | .552 | .272 | .262 | .606 | .265 |
| Q14 | .620 | .266 | -.126 | .526 | .046 |
| Q15 | .647 | -.490 | -.084 | -.325 | .343 |

**Extraction Method: Principal Component Analysis; 5 components extracted**

**Table 8:** Eigenvalues calculated by the extraction method-principal component analysis

|  |  |
| --- | --- |
| **Component** | **Initial Eigenvalues** |
| **Total** | **% of Variance** | **Cumulative %** |
| 1 | 4.440 | 29.598 | 29.598 |
| 2 | 2.432 | 16.214 | 45.813 |
| 3 | 2.091 | 13.937 | 59.750 |
| 4 | 1.775 | 11.835 | 71.585 |
| 5 | 1.228 | 8.189 | 79.774 |
| 6 | .946 | 6.306 | 86.080 |
| 7 | .696 | 4.641 | 90.721 |
| 8 | .345 | 2.300 | 93.021 |
| 9 | .264 | 1.760 | 94.781 |
| 10 | .244 | 1.627 | 96.408 |
| 11 | .164 | 1.093 | 97.500 |
| 12 | .152 | 1.012 | 98.512 |
| 13 | .124 | .824 | 99.336 |
| 14 | .063 | .423 | 99.759 |
| 15 | .036 | .241 | 100.000 |

Table 8 showed that the initial eigenvalues fall below 1 after the 5th component, and 5 5-factor solution was found



**Figure 1:** Scree plot

Figure 1 reveals the scree plot of the questionnaire, which signifies the number of factors in the construct. Here, the figure reveals five factors in the construct. The numbers of factors of the questionnaire based on Eigenvalues were obtained from principal component analysis. The first nine eigenvalues were 4.440, 2.432, 2.091, 1.775, 1.228, .946, .696, .345, and .264. The eigenvalues dropped below 1 after the fifth factor. the internal consistency of the IIEF Bangla questionnaire.

**Table 9:** Internal consistency of IIEF Bangla (Sub-scales)

|  |  |  |  |
| --- | --- | --- | --- |
| **Sub-scales** | **Cronbach’s alpha** | **Cronbach's Alpha Based on Standardized Items** | **Number of Items** |
| Erectile function (Item-1,2,3,4,5,15) | .512 | .577 | 6 |
| Orgasmic function (Item-9,10) | .660 | .662 | 2 |
| Sexual desire (Item-11,12) | .700 | .700 | 2 |
| Intercourse satisfaction (Item-6, 7, 8) | .245 | .073 | 3 |
| Overall satisfaction (Item-13,14) | .876 | .876 | 2 |
| Total | .652 | .686 | 15 |

The Cronbach's Alpha value was 0.652. Cronbach’s alpha value ranges from 0 to 1. The more it is, to 1 is more reliable. Cronbach’s alpha value 0.64 -.85 is considered adequate.

**DISCUSSION**

Psychometric validation is essential for developing culturally adapted tools that are measurable, testable, and reproducible [18]. The International Index of Erectile Function (IIEF) is a globally recognized instrument for assessing erectile dysfunction (ED), yet no validated Bangla version existed before this study [19]. Given ED's high prevalence (15% globally, higher in developing nations) and its profound psychosocial impact, this gap hindered clinical assessment and research in Bengali-speaking populations [20]. The study enrolled 93 participants (all male), with most aged 31–50 years (68%, n=63), mirroring demographic trends in an Iranian validation study [21]. Urban respondents (66%, n=61) predominated, likely due to the study site’s location in Dhaka, consistent with findings from Arafat and Ahmed [22]. Comorbidities were prevalent (62%, n=57), with diabetes (20%) and hypertension (17%) being most common, aligning with ED’s known association with metabolic disorders [23]. Higher education levels (80% secondary or above) among participants may reflect improved health-seeking behavior, as stigma often deters less-educated individuals from seeking care [24]. The Bangla IIEF was developed through rigorous translation, back-translation, and expert review (4 psychiatrists, 2 translators). Face and content validity were ensured via committee consensus [25]. Construct validity, assessed through exploratory factor analysis (EFA), revealed a 5-factor structure, consistent with the original IIEF [26]. The Kaiser-Meyer-Olkin (KMO) measure (0.551) confirmed sampling adequacy for EFA [27]. Cronbach’s alpha for internal consistency was 0.652, within the "adequate" range (0.64–0.85) per psychometric standards [28]. While lower than some international studies (e.g., 0.73–0.96 in a previous study, this aligns with other cross-cultural adaptations. The Bangla IIEF’s mean score (33.35 ±11.94) and psychometric robustness support its utility in clinical and research settings. It enables standardized ED assessment, facilitates cross-cultural comparisons, and improves management strategies in Bangladesh. Future studies should explore its applicability in rural populations and validate it against physiological measures.

**Limitations:**

This study has several limitations: (1) Single-center design at a tertiary hospital may limit generalizability despite diverse participants; (2) COVID-19 restrictions reduced sample size (n=93 vs. target n=100) and disrupted data collection; (3) Test-retest reliability was omitted due to ethical constraints; (4) Self-report nature precluded inter-rater reliability assessment; (5) Criterion/concurrent validity could not be evaluated due to lack of culturally adapted comparator tools; (6) Funding constraints affected study scope.

**CONCLUSION**

Sexuality is integral to human well-being, and erectile dysfunction (ED) profoundly impacts individuals and relationships. The IIEF enables comprehensive assessment of male sexual function, guiding effective clinical management. This study validates the Bangla IIEF as a psychometrically robust tool (Cronbach’s α=0.652, 5-factor structure), addressing a critical gap in care for Bengali-speaking populations. Its use is strongly recommended for clinical practice and research to improve ED diagnosis and treatment outcomes in Bangladesh.

**Recommendation:**

1. Implement the Bangla IIEF in clinical and research settings to enhance ED assessment.
2. Conduct larger multicenter studies for broader validation and community comparisons.
3. Develop clinician-rated ED scales and culturally adapted tools for other sexual dysfunctions.
4. Utilize this tool for treatment evaluation and self-awareness initiatives.
5. Encourage mental health professionals to adopt it for comprehensive patient care.

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