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# Measurement of validity and reliability of Bengali-translated Incontinence Severity Index questionnaire

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## Abstract

**Objective** The purpose of the study was to verify the psychometric properties of the Bengali-translated Incontinence Severity Index (ISI) questionnaire.

**Materials and methods** A test–retest data collection method was conducted with 47 respondents using the Bengali-translated ISI questionnaire.

**Results** The mean age of the respondents was 41.4 years; standard deviation (S.D.)  $\pm$  9.90. Most of the women were suffering with moderate severity of urinary incontinence 48.9% ( $n = 23$ ). The present study determined that Bengali-translated ISI questionnaire was valid and reliable. In addition, present study reflected on the content validity of the Bengali version of ISI questionnaire was  $1 > 0.75$ ; internal consistency  $\alpha = 0.80$  and intra-class correlation (ICC) = 0.86 respectively.

**Conclusion** The Bengali version of ISI questionnaire is valid and reliable measurement tool to extent the severity of urinary incontinence in the cultural context of Bangladesh.

**Keywords** Incontinence Severity Index, Reliability, Urinary incontinence, Validity

## Background

Urinary incontinence (UI) is a common condition among the women. It can be demarcated as an involuntary leakage of urine resultant depression and embarrassment [1]. Therefore, early detection of severity of urinary incontinence is an important issue to prevent the poor quality of life of sufferers. There are various measurement tools to measure the severity of urinary incontinence. However, to date, there has been no Bengali-translated questionnaire to measure the severity of urinary incontinence.

Therefore, self-reported questionnaires are needed to assist early detection and measurement of severity of urinary incontinence.

The present study considered the Incontinence Severity Index (ISI) to measure the validity and reliability of its Bengali version. It is a valid and reliable measurement tool and widely used worldwide [2]. ISI is a two-item questionnaire, which is used to measure the severity of urine leakage. The first item measures the frequency, whereas the second item is used to measure the volume of urinary incontinence. The value of the scale is scored from 1 to 12 items resulting from eight levels multiplicative score. The severity of urinary incontinence expressed as “slight” considering the scores 1 and 2; “moderate” taking into account of scores 3, 4, and 6; “severe” in view of scores 8 and 9; or “very severe” considering the score 12 [2].

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## Material and methods

The study was conducted from October to December 2019 among 47 respondents who came at the outpatient unit of the Centre for the Rehabilitation of the Paralyzed (CRP). The participants were selected by the convenient sampling procedure. Nevertheless, inclusion and exclusion criteria were determined for sample selection.

The inclusion criteria considered those respondents who were native Bengali speaking women, presences of urinary incontinence as per the definition of International Continence Society, age ranged 18–60 years, and were agreeable to participate. The study excluded those women who were at postpartum period, had pelvic floor surgery, or other neurological complications.

The translation and cross-cultural adaptation process were conducted by the utilization of linguistic validation framework of Mapi Research Institute [3]. Forward translation of the questionnaire was conducted by the two clinical physiotherapists with 5 years of clinical experiences who were experienced in translating health-related questionnaire. Forward translation was synthesized by a senior clinical physiotherapist and the 3rd version of the translation was formulated. Followed by, backward translation was done by the two bilingual faculty members of Bangladesh Health Professions Institute (BHPI). These two backward translators were blind towards the original English version. Then, the expert committee including all the translators and the researcher revised the updated Bengali version and a new harmonized translation was created. After that, a prefinal Bengali version was determined by a pilot testing with 20 respondents. According to that pilot testing, when all the participants easily understood each item of the questionnaire and it was possible to score easily, then the newly formulated Bengali version was approved without further modification.

After ensuring the linguistic validation of the questionnaire, the content validity, internal consistency, and test–retest reliability were conducted. The content validity was conducted through four experts. These experts were working for more than 5 years at the musculoskeletal unit and research monitoring and evaluation department. Subjective judgments of those professionals were required to rate the score of content validity score (CVI). Internal consistency of the Bengali-translated ISI questionnaire was measured based on the correlations between the different items of the ISI questionnaires on the same test [4]. Test–retest reliability was conducted over time with 1-week interval [5].

The Statistical Package of Social Sciences Software (SPSS) 20.0 version was used for data management. The study followed Cronbach's alpha statistical test and intraclass correlation (ICC) (2,1) model to measure the internal consistency and test–retest reliability respectively.

## Results

The mean age of the respondents was 41.4 years; standard deviation (S.D.)  $\pm 9.90$ . Among the respondents, majority of them were housewives 61.7% ( $n=29$ ). In addition, the women from urban area with secondary level of education were predominant: 76.6% ( $n=36$ ) and 23.4% ( $n=11$ ) respectively.

### Percentage of severity of urinary incontinence according to ISI questionnaire

The linguistic validation of Bengali ISI questionnaire was assured by the step-by-step scientific process of forward translation, reconciliation, and revision by the expert committee. Subsequently, the final version of the questionnaire was settled throughout the clarification of the respondents by asking open ended questionnaire on prefinal version.

All the respondents certainly answered both the items of the questionnaire. The investigators recognized that respondents did not face any comprehension, conceptual, or cultural adaptive difficulties to answer the two consequent items of the questionnaire. The study findings illustrated that Bengali-translated Incontinence Severity Index questionnaire apprehended the abstraction of original English version. The Bengali ISI was ostensibly comprehensible and known as an essential data collection material to measure the severity of urine leakage at the context of Bangladesh [6].

The mean frequency and amount of urinary incontinence were 2.6 (S.D.  $\pm 1.20$ ) and 2.0 (S.D.  $\pm 0.64$ ) in particular. Consequently, the mean ISI score was 5 (S.D.  $\pm 3.10$ ). The percentage of frequency, amount, and category of Incontinence Severity Index questionnaire is shown in Table 1.

### Measurement of content validity of ISI questionnaire

Subjective evaluation of four expertise was used to measure the content validity of each item of questionnaire stating the criteria “relevance,” “clarity,” “simplicity,” and “ambiguity.” These variables were measured by 4-point content validity index (CVI). The content validity score was  $1.0 > 0.75$  for both the items of the questionnaire. Therefore, no amendment was required in the translated version of ISI questionnaire as well.

### Measurement of internal consistency of ISI questionnaire

Internal consistency of the Bengali-translated ISI questionnaires was measured based on the correlations between two items of the ISI questionnaires on the same test. The study dignified, whether two different items of ISI questionnaire that proposes to identify the severity of urinary incontinence to produce similar scores. It was measured by subjective approach to the 2-item ISI

**Table 1** Percentage of frequency, amount, and category of urinary incontinence

Characteristics	Number (n)	Percentage (%)
<b>Frequency</b>		
Less than once in a month	11	23.4
A few times a month	13	27.7
A few times a week	14	29.8
Every day and/or night	9	19.1
<b>Amount</b>		
Drops	9	19.1
Small splashes	28	59.6
More	10	21.3
<b>Category</b>		
Slight (1–2)	13	27.7
Moderate (3–6)	23	48.9
Severe (8–9)	7	14.9
Very severe (12)	4	8.5

**Table 2** Measurement of internal consistency of the ISI questionnaire

Statistics for scale	N	Mean	Variance	S.D
	2	8.87	7.24	2.69
Item-total statistics	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Cronbach's alpha if item deleted
Item 1	7.0851	13.123	0.621	0.650
Item 2	7.6170	15.937	0.648	0.746

questionnaire. The present study identified a good reliability considering the Cronbach’s alpha test ( $\alpha=0.773$ ). The internal consistency of the items of the questionnaire is presented in Table 2.

**Measurement of test–retest reliability of ISI questionnaire**

The reliability of the Bengali-translated ISI questionnaire was conducted as a test measures over time. The same test conducted twice towards the same patient within

1-week interval. The reliability test was conducted by a senior clinical physiotherapist with more than 5 years of clinical experience at the musculo-skeletal unit of CRP. The study findings suggested a good reliability with the average measure of intra-class correlation (ICC) $>0.75$ ; ICC=0.899. The test–retest reliability of Bengali version of ISI is presented in Table 3.

**Discussion**

The ISI questionnaire was developed by Sandvik et al. [7]. It is short, precise questionnaire and easy to use to find out the severity of urine leakage. Measurement is an integral part to provide the treatment and to improve the quality of life of women suffering with urinary incontinence.

The similar finding was presented in a previous study conducted by a Scottish group in a Spanish language who demonstrated that ISI questionnaire’s reliability and responsiveness were also good. The test–retest reliability of Spanish version of ISI for each question was good stated the kappa was 0.69 for question 1 and 0.83 for question 2 [8]. This questionnaire has acquired the highest recommendation from the second and third International Consultation on Incontinence [8]. In addition, another study reported that 88.0% respondents mentioned the same category of symptom severity at 3-day interval of data collection with kappa ( $k=0.74$ ) [9].

Murphy et al. conducted a cohort study with 170 participants to measure the construct validity of ISI questionnaire [10]. The findings of the study suggested that there was an utmost correlation between the ISI and stress symptoms subscales of Urogenital Distress Inventory (UDI-6) questionnaire after surgical intervention [10]. Another epidemiological study stated that ISI is a useful measurement tool to measure the severity of urinary incontinence [7].

Moreover, the present study illustrated the content validity of each item of the Bengali ISI questionnaire which was  $>0.75$ . Therefore, it would be concluded that the Bengali ISI is a valid, reliable, and applicable measurement tool to use in the context of Bangladesh.

**Table 3** Measurement of test–retest reliability of the Bengali ISI questionnaire

	Intra-class correlation	95% confidence interval		Level of significance	
		Lower bound	Upper bound	Value	Sig
Q.1. "How often do you experience urine leakage?"	0.910	0.839	0.950	11.130	0.000
Q.2. "How much urine do you lose each time?"	0.889	0.801	0.938	9.020	0.000
Average measures	0.899	0.820	0.944	10.070	0.000

A limitation of the present study can be considered as the convenient sampling procedure which might also hinder the generalizability of the study findings. However, the same inclusion and exclusion criteria were followed for all the women with urinary incontinence. Therefore, it can be said that the participants were homogenous characteristically and this questionnaire can be utilized as a follow-up of urinary incontinence severity measurement tool. Besides, the study did not consider the urinary incontinent women who were suffering with neurological, pathological, or surgical complications. Hence, further studies would consider using large sample size with various conditions. Morgado et al. suggested to recruit the heterogenous participants along with the random sampling procedure for the validity and reliability measurement of the outcome measures [11]. Although the present study conducted the content validity of the Bengali version of the questionnaire utilizing the expert's opinion, however, further studies can consider the opinions from the target group of people as well to assure the validity [11].

## Conclusion

The Bengali version of ISI questionnaire could be utilized for the measurement of frequency and amount of urinary incontinence in Bangladesh. Both the items of the questionnaire were culturally adaptive, valid, and reliable to evaluate the severity of urinary incontinence in Bangladesh.

## Abbreviations

BHPI	Bangladesh Health Professions Institute
CRP	Centre for the Rehabilitation of the Paralysed
CVI	Content validity index
ICC	Intra-class correlation
ISI	Incontinence Severity Index
SD	Standard deviation
UDI	Urogenital Distress Inventory
UI	Urinary incontinence

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## Authors' contributions

Regarding author contribution, SN acted as a major contributor in data collection, analysis, and writing manuscript. TS, AP, and CP performed in conceptualization and analysis of the manuscript. All authors read and approved the final manuscript.

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## Availability of data and materials

The authors also assured the availability of data and materials.

## Declarations

### Ethics approval and consent to participate

The present study conducted with the ethical approval from the CRP Ethical Committee (EC) with the reference number CRP-R&E-0401–280. In addition, respondents' consents were also accomplished.

### Consent for publication

Not applicable.

### Competing interests

The authors declare that they have no competing interests.

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## References

- Norton P, Brubaker L. Urinary incontinence in women. *Lancet*. 2006;367:57–67.
- Sandvik H, Espuna M, Hunskaar S. Validity of the incontinence severity index: comparison with pad-weighing tests. *Int Urogynecol J*. 2006;17:520–4.
- Varni JW. Linguistic validation of the PedsQLTM—a quality of life questionnaire. Lyon: Mapi Research Institute; 2002. Available from: <http://www.pedsq.org/translations.htm>. Cited 2012 Jun.
- Lyubomirsky S, Lepper HS. A measure of subjective happiness: preliminary reliability and construct validation. *Soc Indic Res*. 1999;46:137–55.
- Bolarinwa OA. Principles and methods of validity and reliability testing of questionnaires used in social and health science researches. *Nigeria Postgrad Med J*. 2015;22:195–201.
- Nipa SI, Phongnarisorn C. Linguistic validation of incontinence severity index (ISI) questionnaire in Bengali language. *Int J Lingu Lit Trans*. 2020;3:39–45.
- Sandvik H, Hunskaar S, Seim A, Hermstad R, Vanvik A, Bratt H. Validation of a severity index in female urinary incontinence and its implementation in an epidemiological survey. *J Epi Com Health*. 1993;47:497–9.
- Hanley J, Capewell A, Hagen S. Validity study of the severity index, a simple measure of urinary incontinence in women. *British Med J*. 2001;32:1096–7.
- Klovning A, Avery K, Sandvik H, Hunskaar S. Comparison of two questionnaires for assessing the severity of urinary incontinence: the ICIQ-UI SF versus the incontinence severity index. *Neurourol Urodyn: Off J Int Cont Soc*. 2009;28:411–5.
- Murphy M, Culligan PJ, Arce CM, Graham CA, Blackwell L, Heit MH. Construct validity of the incontinence severity index. *Neurourol Urodyn: Off J Int Cont Soc*. 2006;25:418–23.
- Morgado FF, Meireles JF, Neves CM, Amaral AC, Ferreira ME. Scale development: ten main limitations and recommendations to improve future research practices. *Psicol: Reflex Critic*. 2017;30:3.

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