

Original Article



Bangla Version of the Boston Carpal Tunnel Questionnaire: Translation, Cross-Cultural Adaptation, Validation and Reliability Assessment

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Abstract

Background: Self-reported instruments are outstanding predictor of symptom severity and functional status, hence represent a patient's view and capture the full extent of disability. The Boston Carpal Tunnel Questionnaire (BCTQ) is a patient reported self-assessment tool for the peoples with Carpal Tunnel Syndrome (CTS). **Objective:** Our intension was to develop a reliable, validated and culturally adapted Bangla version of original BCTQ (B-BCTQ). **Materials and Methods:** The B-BCTQ was succeeded following a structured process that included translation, verification, compromise assessment, reverse translation, feedback, and final correction. B-BCTQ reliability and validity were conducted in 48 CTS patients. The reliability was evaluated by performing internal consistency and test-retest analyses. Its validity was assessed by comparing the B-BCTQ with the Physical functioning subscale (PF-10) of Short Form health Survey (SF-36) scale. **Results:** Cronbach's alpha was 0.89 for symptom severity scale (SSS) and 0.86 for functional status scale (FSS). Also, Intra-class Correlation Coefficients (ICCs) were calculated as 0.86 for SSS and 0.91 for FSS. Pearson correlation (0.80 for SSS and 0.83 for FSS) analysis demonstrated that the B-BCTQ score was significantly correlated with the PF-10 of SF-36. All of the items were statistically significant ($P < 0.001$). **Conclusion:** The B-BCTQ is successfully adapted. The study findings support the previous English version indicating its validity and reliability.

Key words: Translation, Reliability, Validity, Carpal tunnel syndrome, B-BCTQ

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Introduction

Clinical researchers are exhibiting outright desire to utilize the patient oriented self-reported outcome instruments in their scientific endeavors. Those tools are finer prognosticator of the diseases and disabilities which seizes a patient's perspective and capture the extent of functional impairment caused by the offending ailments.¹ Specified questionnaire based on a distinct disease or condition are decisively more responsive and sensitive than others.²

To evaluate symptom severity and functional status Levine et al. curved out BCTQ which is concrete for carpal tunnel symptom.

In our study we referred this instrument as BCTQ, albeit of its diverse synonym, such as the Brigham and Women's Carpal Tunnel Questionnaire, the Boston carpal Tunnel Questionnaire, the Levine questionnaire or the Carpal Tunnel Syndrome Instrument.³⁻⁷ To improve the quality of health service, psychological, mental, and physical aspects need to be grappled with congruously. BCTQ, as a generic tool will help in delivering these issues satisfactorily. Restriction in activities of daily living (ADLs) are important clinical factors to the Rehabilitation physicians for the evaluation and management planning. Questionnaire is an easy, simple, rock-bottom way to collect clinical data. When a clinical instrument adopted by diverse

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set-ups like countries, cultures or languages, it ought to be reliable, valid and well translated.^{8,9}

Bangla is in the fifth position by number of native speakers according to 2019 edition of Ethnologue, a language reference published by SIL International.¹⁰ In such a large population, a valid, reliable and reproducible instrument will be in needed to juxtapose the results and experiences of various therapeutic interventions. BCTQ has found to be available in various languages such as: Original (English), Turkish, Chinese, Persian, Hindi, Portuguese, Korean, Thai, Dutch, Malay, Spanish, Greek, Swedish, Japanese, Hongkong Chinese.^{3,11-24} However, it is not yet available in Bangla language.

The BCTQ is a patient reported self-assessment tool that contains two scales used to assess severity of symptoms and functional limitations in peoples with CTS.³ The symptom severity scale consist of 11 items and functional status scale consists of 8 items. For each of the scales, the respondent is asked to determine his/her position using a multiple-choice scale that ranges from 1 (normal, no difficulty) to 5 (very serious, can't perform activity). The final score is calculated for each of the scales independently and is represented using the mean of the individual scores, higher final scores reflect worse representation of the patient's condition.

Materials and Methods

The study was conducted at the department of Physical Medicine and Rehabilitation of the Bangabandhu Sheikh Mujib Medical University (BSMMU).

The participants were the native Bengali patients who were diagnosed with CTS by a physician using history, clinical examination and nerve conduction study. Patients who were unable to fill the questionnaire due to visual, cognitive, literacy related problems or a recent history of Carpal Tunnel Release in the same extremity were excluded.

The BCTQ was adapted to the Bengali population according to the guidelines of Beaton et al. Two polyglot translators independently transformed the English version of BCTQ into Bangla. The self-governing translation matched unarguably. The two ensuing Bangla draft versions were then blended into a single Bangla version by two translators. This rendition was then given to a third researcher, a dispassionate inherent English speaker fluent in Bangla for back-translation into English. The back-translation matched the prime version. To eradicate any comprehension blocks, the final Bangla version was tried on 20 volunteer patients to guarantee that partakers would define each item as originally intended. The final Bangla version (B-BCTQ) was then assessed to verify its reliability and validity.

The B-BCTQ reliability and validity were piloted in 48 CTS affected role.

The reliability was evaluated by performing the internal consistency and test-retest analyses.

B-BCTQ was tested to yield internal consistency by Cronbach's

alpha. A Cronbach's alpha of 1.0 denoted a consummate correlation among all items, whether ≥ 0.7 indicated an acceptable internal consistency.

Test-retest reliability: For test-retest reliability, the B-BCTQ was dish up to 48 CTS patients after being registered along with their informed written consent where the accomplices were requested to fill questionnaire again after 7 days of the first acceptance without any medication's adjustment in between. Intra class correlation coefficient (ICC) was used to assess the test-retest reliability. The ICC was expected to be found ≥ 0.70 ; if so, considered as acceptable for test-retest reliability.

In the course of assessment of validity, the Construct validity was assessed by correlating the Physical functioning subscale (PF-10) of Short Form health Survey (SF-36) scale with B-BCTQ and examined by Pearson correlation coefficient.

All statistical analyses were performed using SPSS version 22.0. A p-value less than 0.05 was considered statistically significant.

The participants signed an informed consent to participate in the study. The protocol was approved by the institutional review board of BSMMU, Dhaka, Bangladesh. (BSMMU/2015/13161)

Results

Among our study population just more than one-third were males (18, 37.50%) and near about two-third were females (30, 62.50%), the mean age of which was 37.38 ± 12.40 , for the most part of them is middle aged and older. Regarding literacy level, 4 were illiterate, 8, 12 and 17 went up to primary, secondary and higher secondary level respectively and 7 were graduates. The most of them (17) were housewives, 7 were businessmen, 9 were garment workers, 5 were teachers, 4 were retired persons, 4 were unemployed, and 2 were guards (Table-I).

Table I: Socio-demographic characteristics of the respondents (n=48)

| | | Frequency | Percentage (%) |
|---------------------------|------------------|-------------------------|----------------|
| Sex | Male | 18 | 37.50 |
| | Female | 30 | 62.50 |
| Age | 21-30 | 17 | 35.41 |
| | 31-40 | 13 | 27.08 |
| | 41-50 | 10 | 20.83 |
| | 51-60 | 06 | 12.50 |
| | 61-70 | 02 | 04.16 |
| | | Mean: 37.38 ± 12.40 | |
| Educational status | Illiterate | 04 | 08.33 |
| | Primary | 08 | 16.67 |
| | Secondary | 12 | 25.00 |
| | Higher Secondary | 17 | 35.42 |
| Profession | Graduate | 07 | 14.58 |
| | Housewife | 17 | 35.42 |
| | Businessman | 07 | 14.58 |

We didn't encounter any vital linguistic barrier or social setback in the course of forward and backward translations. From the societal view point some trivial inconsistencies arose. For illiterate patients, "Writing" was replacing with "Stitching" as it has been a long cultural tradition for household women in rural Bengal. "Holding a book while reading" was also modified as "stirring the cooking pan" for the illiterate fellow. In Bangla, we didn't find a suitable substitute for 'household chores', so we changed it to 'household task'. Almost all of our participants had no intricacy to recognize the translated items, and all of them responded to all components of the B-BCTQ.

Reliability:

Internal consistency with Cronbach's alpha for B-BCTQ instrument was 0.89 for BCTQ-SSS (severity of symptoms) and 0.86 for BCTQ-FSS (functional status) (Table-II). Alpha should be > 0.7 or 0.8, which is standard for all scores.²⁵

Table II: Internal Consistency

| B-BCTQ | Number of Item | Cronbach's Alpha |
|--------|----------------|------------------|
| SSS | 11 | 0.89 |
| FSS | 08 | 0.86 |

SSS: Symptom Severity Scale, FSS: Functional Status Scale

Test-retest reliability: Calculated total BCTQ, Intra-class Correlation Co-efficient (ICC) was 0.86 (0.83-0.92) with 0.85 for BQ-SSS and 0.91 for BQ-FSS which were highly significant (Table III).

Table III: Intra-class Correlation Coefficient

| Scale | Score | Significance |
|------------|-------|--------------|
| Total BCTQ | 0.86 | p<0.001 |
| BQ-SSS | 0.85 | p<0.001 |
| BQ -FSS | 0.91 | p<0.001 |

Validity:

Construct validity: Higher B-BCTQ score and lower SF-36 score indicates extend of severity. There up on a negative correlation with SF-36 implies a positive association. All of the items were statistically significant (P<0.001) (Table IV).

Table IV: Construct validity expressed by Pearson's Correlation between B-BCTQ (FSS, SSS) and PF-10

| PF-10 | SSS | FSS |
|-------------|--------|--------|
| Correlation | 0.80 | 0.83 |
| P-value | <0.001 | <0.001 |

Table V: Comparing reliability and validity of B-BCTQ with different studies

| Author | Versions | Cronbach alpha | | ICC | | V CQ | Validity | |
|---------------------------|--------------------|----------------|------|------|------|----------------|----------|------|
| | | SSS | FSS | SSS | FSS | | SSS | FSS |
| Our study | Bangla version | 0.89 | 0.86 | 0.85 | 0.91 | PF -10 | 0.80 | 0.83 |
| Original study | English version | 0.89 | 0.88 | 0.91 | 0.93 | Pinch strength | 0.47 | 0.60 |
| | | | | | | Grip strength | 0.38 | 0.50 |
| Kim, J. K. | Korean version | 0.89 | 0.90 | 0.92 | 0.94 | K -DASH | 0.61 | 0.67 |
| Lue, Y. J. | Chinese version | - | - | 0.86 | 0.75 | DASH | 0.63 | 0.75 |
| Mody, J. N. | Indian version | 0.87 | 0.91 | - | - | - | - | - |
| Upatham, S. | Thai version | 0.86 | 0.84 | - | - | - | - | - |
| Sezgin, M | Turkish version | 0.82 | 0.88 | 0.60 | 0.77 | PF -10 | 0.55 | 0.54 |
| Marin, M. T. | Spanish version | 0.91 | 0.87 | 0.93 | 0.98 | Dynamometer | 0.77 | 0.75 |
| Atroshi, I. | Swedish version | 0.80 | 0.87 | 0.64 | 0.71 | PF -10 | 0.30 | 0.62 |
| De Campos, C. C. | Portuguese version | 0.83 | 0.90 | 0.60 | 0.55 | - | - | - |
| Hassankhani, G. G. | Persian version | 0.86 | 0.88 | 0.53 | 0.77 | Quick -DASH | 0.70 | 0.64 |
| Abdullah, A. | Malaysian version | 0.87 | 0.90 | 0.83 | 0.91 | MV -DASH | 0.80 | 0.83 |

ICC=Intra class correlation coefficient, VCQ= Validity comparing questionnaires, PF-10= Physical functioning scale of SF-36, DASH=Disability of Arm, Shoulder and Hand Questionnaire

Appendix - 1

Bangla Version of Boston Carpal Tunnel Questionnaire (B-BCTQ)

বোস্টন কারপাল টানেল প্রশ্নমালা

টেবিল-১

উপসর্গের মাত্রা পরিমাপক

নামঃ

হাতঃ () ডান () বাম

তারিখঃ...../...../.....

রেজিঃ নং -

(নিম্নে উল্লিখিত প্রশ্নগুলো গত দুই সপ্তাহে প্রতি ২৪ ঘন্টায় আপনার রোগের উপসর্গ সম্পর্কে আপনার জন্য করা হবে। প্রতিটি প্রশ্নের একটি উত্তরে গোল চিহ্ন দিন)

১) আপনার হাত বা কজির ব্যথা রাতে কতটা তীব্র ভাবে অনুভূত হয় ?

ক) কোন ব্যথা হয় না...(১)

খ) অল্প ব্যথা হয়...(২)

গ) মধ্যম মানের ব্যথা হয়...(৩)

ঘ) বেশী ব্যথা হয়...(৪)

ঙ) অনেক বেশী ব্যথা হয়...(৫)

২) গত দুই সপ্তাহে আপনার হাত বা কজির ব্যথার কারণে রাতে কতবার ঘুম ভেঙ্গে গেছে ?

ক) কখনোই না...(১)

খ) একবার...(২)

গ) দুই বা তিনবার...(৩)

ঘ) চার থেকে পাঁচবার...(৪)

ঙ) পাঁচবারের বেশী...(৫)

৩) দিনের বেলায় কি হাতে বা কজিতে কোন ব্যথা অনুভব করেন ?

ক) কখনোই ব্যথা অনুভব করিনি...(১)

খ) অল্প ব্যথা অনুভব করি...(২)

গ) মধ্যম মানের ব্যথা অনুভব করি...(৩)

ঘ) বেশী ব্যথা অনুভব করি...(৪)

ঙ) অনেক বেশী ব্যথা অনুভব করি...(৫)

৪) দিনে কতবার আপনি হাত বা কজি তে ব্যথা অনুভব করেন ?

ক) কখনোই না...(১)

খ) এক বা দুই বার...(২)

গ) তিন থেকে পাঁচবার...(৩)

ঘ) পাঁচবারের বেশী...(৪)

ঙ) সবসময় থাকে...(৫)

৫) দিনের বেলা গড়ে কতক্ষণ ব্যাথা থাকে ?

ক) আমি কখনই দিনের বেলা ব্যাথা অনুভব করিনি...(১)

খ) ১০ মিনিটের কম...(২)

গ) ১০-৬০ মিনিট...(৩)

ঘ) ৬০ মিনিটের বেশী...(৪)

ঙ) আমি দিনে সবসময় ব্যাথা অনুভব করি...(৫)

৬) আপনি কি হাতে অবশ (অনুভূতিহীনতা) বোধ করেন ?

ক) না...(১)

খ) অল্প...(২)

গ) মধ্যম মানের...(৩)

ঘ) বেশী...(৪)

ঙ) অনেক বেশী...(৫)

৭) আপনি কি হাতে বা কব্জি তে কোন দুর্বলতা অনুভব করেন ?

ক) কোন দুর্বলতা নেই...(১)

খ) অল্প দুর্বলতা...(২)

গ) মধ্যম মানের দুর্বলতা...(৩)

ঘ) বেশী দুর্বলতা...(৪)

ঙ) অনেক বেশী দুর্বলতা...(৫)

৮) আপনার হাত কি কিনকিন করে ?

ক) কিনকিন করে না...(১)

খ) অল্প কিনকিন করে...(২)

গ) মধ্যম মানের কিনকিন করে...(৩)

ঘ) বেশী কিনকিন করে...(৪)

ঙ) অনেক বেশী কিনকিন করে...(৫)

৯) রাতের বেলা আপনার কিনকিন বা অবশ (অনুভূতিহীনতা) ভাবের তীব্রতা কেমন অনুভব করেন ?

ক) কখনো অনুভব করিনি...(১)

খ) অল্প থাকে...(২)

গ) মধ্যম মানের থাকে...(৩)

ঘ) বেশী থাকে...(৪)

ঙ) অনেক বেশী থাকে...(৫)

১০) গত দুই সপ্তাহে প্রতিরাত্তে কতবার আপনার হাত বা কব্জির কিনকিন বা অবশ ভাবের কারণে ঘুম ভেঙ্গে গেছে ?

ক) কখনোই না...(১)

খ) একবার...(২)

গ) দুই থেকে তিনবার...(৩)

ঘ) চার থেকে পাঁচবার...(৪)

ঙ) পাঁচবারের বেশী...(৫)

১১) ছোট ছোট জিনিস বেমন চাষি বা কলম ধরতে এবং ব্যবহার করতে আপনার কি কোন সমস্যা হয় ?

ক) কোন সমস্যা হয় না...(১)

খ) অল্প সমস্যা হয়...(২)

গ) মধ্যম মানের সমস্যা হয়...(৩)

ঘ) বেশী সমস্যা হয়...(৪)

ঙ)অনেক বেশী সমস্যা হয়...(৫)

টেবিল-২

অক্ষমতার মাত্রা পরিমাপক

গত দুই সপ্তাহে প্রতিদিন হাত বা কজির উপসর্গের কারণে নিম্নে উল্লিখিত কাজকর্ম করতে আপনার কি কোন সমস্যা হয়েছে ?

(দয়া করে আপনার কাজের সামর্থ্যের সাথে যে নম্বরটি মিলে যায় তাতে গোল চিহ্ন দিন)

| | কোন সমস্যা নাই | অল্প সমস্যা | মধ্যম মানের সমস্যা | বেশী সমস্যা | হাত বা কজির সমস্যার কারণে একদম কাজ করতে পারেন না | ফলাফল |
|-----------------------|----------------|-------------|--------------------|-------------|--|-------|
| লেখা | ১ | ২ | ৩ | ৪ | ৫ | |
| জানার বোতাম লাগানো | ১ | ২ | ৩ | ৪ | ৫ | |
| বই হাতে নিয়ে পড়া | ১ | ২ | ৩ | ৪ | ৫ | |
| টেলিফোন ধরা | ১ | ২ | ৩ | ৪ | ৫ | |
| বোতলের ছিপি খোলা | ১ | ২ | ৩ | ৪ | ৫ | |
| ঘরের ছোট ছোট কাজ করা | ১ | ২ | ৩ | ৪ | ৫ | |
| বাজারের ব্যাগ বহন করা | ১ | ২ | ৩ | ৪ | ৫ | |
| গোসল করা ও কাপড় পরা | ১ | ২ | ৩ | ৪ | ৫ | |

(Original Article: Levine DW, Simmons BP, Koris MJ, Daltroy LH, Hohl GG, Fossel AH, Katz JN: A self-administered questionnaire for the assessment of severity of symptoms and functional status in carpal tunnel syndrome. Journal of Bone & Joint Surgery - American Volume. 1993, 75: 1585-1592.)

Discussion

A critically claiming tool's appraisal properties are easily administrable, reproducible, valid, reliable and responsive to clinical advancement.²² The B-BCTQ (Appendix-1) takes roughly 10 minutes to be completed, so it doesn't foist any extra strain on patients and researchers.³

Reliability and validity are the crux of quality assessment. A reliable instrument yields the xerox result on diverse occasions. Test-retest and internal consistency are two main established facets of reliability as a measurement tool of a patient's evaluation.⁵ In our study severity of symptoms (SSS, Cronbach's alpha was 0.89) and functional status (FSS, Cronbach alpha was 0.86) were very good which quite fairly indicates that the internal consistency measures a single concept of the questions of a scale supported by the results from the Original, Turkish, Persian, Portuguese, Korean, Malay, Spanish and Swedish version of the BCTQ.^{11,13,15,16,19,20}

Same result in repeated application attested the true reflection of Test-retest reliability.^{3,26,27} The B-BCTQ brings in a excellent result in test-retest repeatability with Intra class Correlation coefficients of 0.86 (BCTQ-SSS) and 0.91(BCTQ-FSS) which was as good as original English, Korean, Spanish and Malay versions of BCTQ.

An instrument is referring to be a valid one, when it measures what it is intended to measure. Assessment of symptom severity or functional status has not had yet a globally acknowledged standard. B-BCTQ were correlated with physical functioning subscale of SF-36 for the measurement of construct validity which was very good and statistically significant (SSS=0.80 and FSS=0.83) in contrast to Swedish and Turkish version, which determined that both SSS and FSS had moderate and good correlations with physical functioning subscale of SF-36.

Conclusion

Adaptation of the B-BCTQ for use in Bangladesh was successful. Our result support previous finding of the English version, indicating that it is valid and reliable.

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