Original Research Article

Reliability and Validity Study of Gujarati Versions of Sciatica Bothersomeness Index and Sciatica Frequency Index

Mohit Bipin Shah[1], Neela Chetan Soni[2]

[1]Ph.D. Scholar, Gujarat University, Lecturer (MPT), Khyati Institute of Physiotherapy, 15, Cantonment, Shahibaug, Ahmedabad, Gujarat, India.
[2]Ph.D. Guide, Gujarat University, Academic Director (MPT, Ph.D.), SKUM College of Physiotherapy, Drive-in Road, Ahmedabad, Gujarat, India.

Corresponding Author: Mohit Bipin Shah

ABSTRACT

Background: Sciatica Bothersomeness Index and Sciatica Frequency Index are used as the outcome measures for evaluation of bothersomeness and frequency of radiating symptoms in patients with low back pain with radiculopathy. So far, validated Gujarati versions of SBI and SFI have not been reported.
Aim: To validate the Gujarati versions of SBI and SFI.
Study Design: Cross-sectional study
Materials and Methods: SBI and SFI were translated into Gujarati language using forward and back translation method. Face and content validity were examined by group consensus method by an expert committee which consisted of the authors, orthopaedic surgeon, general practitioner and physiotherapists experienced in the field of musculoskeletal rehabilitation. Concurrent validity was examined by correlating SBI and SFI with Maine Seattle Back questionnaire and subscales of SF-36 on 56 patients with lumbosacral radiculopathy aged 18 to 60 years. Test retest reliability was examined by collecting data on initial visit and after 48 hours.
Results: The items were accepted with >80% consensus. Concurrent validity measured by Spearman's correlation coefficient indicated that SBI and SFI had strong to moderate correlation with MSBQ, VAS for leg pain and most subscales of SF 36 and weak correlation with vitality subscale and VAS for back pain. SBI and SFI had high internal consistency measured by Cronbach's alpha (alpha=0.94 and 0.89). Test retest reliability was measured by intraclass correlation coefficient which revealed high correlation (ICC=0.84 and 0.78).
Conclusion: Gujarati versions of Sciatica bothersomeness index and sciatica frequency Index are reliable and valid measures and can be used for clinical and research purposes.

Keywords: SBI, SFI, Gujarati, radiculopathy, reliability, validity.

INTRODUCTION

Lumbosacral radiculopathy due to disc herniation or spinal stenosis is a common condition varying from short lasting symptoms, single episodes to a remitting or permanent course over months or years. It is associated with high socioeconomic costs, mainly due to work absenteeism. [1-3] The estimated prevalence rates of lumbosacral radiculopathy range from 1.2% to 43%. [4] In Indian population, the incidence of low back pain with or without radiculopathy has been reported to

be 23.09% and a lifetime prevalence of 60-85%. [5,6]

Traditionally, leg pain, and to some extent back pain, have been utilized to rate symptom severity in lumbosacral radiculopathy. The outcome measures specific to radiating symptoms which are used for clinical and research purposes are Maine Seattle Back Questionnaire, Sciatica bothersomeness Index (SBI) and Sciatica Frequency Index (SFI). [7,8] The SBI and the SFI are both comprised of 4 radiating symptoms scored for bothersomeness and frequency of the radiating symptoms. [8]

The Norwegian and Greek versions of SBI and SFI have been validated. [9,10] So far, Gujarati versions of the indices haven't been reported. Hence, there is a need to translate SBI and SFI to Gujarati and find their reliability and validity.

MATERIALS AND METHODS

This study is a part of a larger, yet unpublished study for which the ethics approval was taken from Medilink ethics committee. A cross-sectional observational study was undertaken. Permission to translate the SBI and SFI to Gujarati language was obtained from Dr. Donald Patrick, the author of both indices. Five step guidelines for translating and evaluation of psychometric properties offered by Beaton and Guillemin [11, 12] were followed:

1. Forward translation: Two forward translations of indices into Gujarati were performed independently by two translators who were bilingual in Gujarati and English. The instructions were given to the translators not to perform the literal translation of words but to perform the conceptual translation of phrases.
2. Synthesis of the translations: In a meeting between two translators and the authors, a common synthesis of Gujarati version of SBI and SFI were formed.
3. Back translation: The synthetic Gujarati versions were back-translated into English by two different translators who were bilingual in Gujarati and English.

4. Expert committee review: To ensure face and content validity, an expert committee including the authors, all translators, an orthopaedic surgeon (n=1), a general practitioner (n=1) and physiotherapists (n=5) experienced in the field of orthopaedic rehabilitation (mean experience=13.85 years) analysed items for content, meaning, wording, format, ease of administration and scoring. Each item was scored as either accepted, rejected or accepted with modification. Consensus was defined as agreement with a question by at least 80% of participant. [13] Prefinal Gujarati versions of the indices were prepared.
5. Test of the pre-final versions: The pre-final versions of the SBI and SFI were tested for comprehensibility among 10 Gujarati speaking patients with lumbosacral radiculopathy.

For analysis of psychometric properties, the final Gujarati versions of SBI and SFI were completed by 56patients with lumbosacral radiculopathy referred to a private clinic in Gujarat, India after obtaining their written and verbal consent. Inclusion criteria were age 18-60 years, positive neurodynamic tests: Straight leg raise test and slump test and ability to read and understand English and Gujarati. Patients were excluded if they had neuropathy, spinal fracture, pregnancy and history of spinal surgery. Data was collected during the initial visit and after 48 hours.

Reliability demonstrates homogeneity (internal consistency) and reproducibility (test-retest reliability). [14] Internal consistency was measured by taking the data on initial visit and test retest reliability were assessed by taking the data during initial visit and after 48 hours interval.

Concurrent validity describes how well the indices correlate with existing gold standard measures, and it was assessed by comparing final scores of SBI and SFI with Maine Seattle Back Questionnaire, Visual analog scale for back pain, Visual analog

scale for leg pain and subscales of SF-36. [15]

SBI and SFI include self-reported ratings of four symptoms: (1) leg pain, (2) numbness or tingling in the leg, foot or groin, (3) weakness in the leg/foot, and (4) back or leg pain while sitting. Each symptom has a range of scores from 0 to 6. The SBI categories have labels at the categories 0 (*Not bothersome*), 3 (*Somewhat bothersome*), and 6 (*Extremely bothersome*). For SFI, the categories are labelled 0 (*Not at all),* 1 *(Very rarely),* 2 *(A few times),* 3 *(About half the time),* 4 *(Usually),* 5 *(Almost always),* 6 *(Always)*.It took 30 seconds to 1 minute to complete each index.

The Maine Seattle Back Questionnaire contains 12 items of impairment and activity limitations due to leg or back pain within the same day. Each item is scored as (1) *yes* or *no* (0), yielding scores in a range from 0 to 12. Higher scores indicate greater disability. MSBQ is reported to be reliable, valid and responsive and is recommended to be used for patients with lumbosacral radiculopathy.[7]It took 2 to 3 minutes to complete the questionnaire.

The short form health survey, SF-36 contains 8 subscales. Each domain is scored from 0, indicating poor health to 100, indicating optimal health. [16, 17] It took 5 to 10 minutes to complete the health survey.

The back pain and leg pain intensity was assessed using the visual analog scale for pain (VAS). It is also a self-reported, valid and reliable measure for pain assessment. It has a 100-mm horizontal line with the left end marked as "no disability" and the right end marked as a "maximum pain". [18]

Statistical Analysis

Statistical analysis was done using SPSSv16. The confidence interval was kept at 95%. Internal consistency was measured using Cronbach's alpha. Test retest reliability was assessed using intraclass correlation coefficients. Concurrent validity was measured by comparing Spearman rank correlation coefficients of SBI and SFI with MSBQ, VAS for back pain, VAS for leg pain and SF-36.

RESULTS

The English versions of SBI and SFI were translated to Gujarati with the least difficulty. After a meeting between all the experts, consensus was reached on all items. The prefinal version which was administered to 10 Gujarati speaking patients with lumbosacral radiculopathy for checking the comprehensibility, it was found that all the items were easily understood and it took 30 seconds to 1 minute to complete each index.

The value of Cronbach's alpha was examined by comparing the values of SBI and SFI scores for each item obtained at initial visit which revealed 0.94 for SBI and 0.89 for SFI indicating high internal consistency. The intraclass correlation coefficient values were 0.84 (0.73-0.90) for SBI and 0.80 (0.66-0.88) for SFI at 95% confidence interval. These values indicate high test-retest reliability for both indices. [19]

Baseline demographic details of 56 subjects who were included for analysis of reliability and concurrent validity are described in Table 1.

Table 1. Patients' baseline demographic characteristics, clinical findings and health status measures:

Subjects	56
Male/Female	24/32
Age in years[*]	35.42 (10.22)
Pain duration in months[*]	2.53 (0.81)
VAS-back in mm[*]	33.42 (7.60)
VAS-leg in mm[*]	41.26 (9.91)
SBI[a*]	13.10 (2.82)
SFI[a*]	12.94 (2.39)
MSBQ[*]	6.80 (1.24)
SF-36 PF[*]	47.23 (7.12)
SF-36 RP[*]	43.30 (18.14)
SF-36 BP[*]	45.39 (13.78)
SF-36 GH[*]	47.42 (10.55)
SF-36 V[*]	75.00 (7.68)
SF-36 SF[*]	74.46 (10.45)
SF-36 RE[*]	64.87 (22.40)
SF-36 MH[*]	49.35 (9.47)
SBI[b*]	12.89 (2.96)
SFI[b*]	12.58 (2.63)

a=Values taken on initial visit, b=values taken after 48 hours interval, *=Mean (SD), SBI=Sciatica bothersomeness index, SFI=Sciatica Frequency Index, MSBQ=Maine Seattle Back Questionnaire, PF=Physical functioning, RP=Role-Physical, BP=bodily pain, GH=general health, V=Vitality, SF=Social functioning, RE=Role emotional, MH=Mental health

Concurrent validity was examined by comparing Spearman rank correlation coefficients of SBI and SFI with MSBQ, VAS for back pain, VAS for leg pain and subscales of SF-36. (Table 2 and 3)

DISCUSSION

The face and content validity were established after the expert committee reached consensus on all items of SBI and SFI and the patients found both the indices to be comprehensible.

The reliability of both indices was established which is evident by high internal consistency for SBI (α=0.94) and SFI (α=0.89). This is consistent with findings of Billis E. et. al., [10] who found very good internal consistency of the Greek version of SBI.

Test-retest reliability of SBI and SFI were established by taking measures at 48 hour interval.

This interval was selected because the authors believed that it was short enough for the treatment or other factors to affect the scores and long enough to prevent recall bias. ICC values for SBI and SFI were 0.84(0.73-0.90) and 0.80(0.66-0.88), respectively which indicated a good test-retest reliability for both indices. This is in line with a study conducted by Grovle L et. al., [9] in which the Norwegian versions of SBI and SFI were found to have ICC values 0.88 and 0.86, respectively.

Table 2: Spearman rank correlation Coefficient between total scores of SBI with other health status measurements:

	SBI	Interpretation
MSBQ	0.731(p<0.05)	Strong positive, significant
VAS (back)	0.225(p=0.095)	Weak positive, not significant
VAS (leg)	0.628 (p<0.05)	Moderate positive, significant
SF36 subscales		
PF	-0.63 (p<0.05)	Moderate negative, significant
RP	-0.822 (p<0.05)	Strong negative, significant
BP	-0.608 (p<0.05)	Moderate negative, significant
GH	-0.803 (p<0.05)	Strong negative, significant
V	-0.447 (p<0.05)	Moderate negative, significant
SF	-0.659 (p<0.05)	Moderate negative, significant
RE	-0.631 (p<0.05)	Moderate negative significant
MH	-0.521 (p<0.05)	Moderate negative, significant
SFI	0.538 (P<0.05)	Moderate positive, significant

SBI=Sciatica bothersomeness index, SFI=Sciatica Frequency Index, MSBQ=Maine Seattle Back Questionnaire, PF=Physical functioning, RP=Role-Physical, BP=bodily pain, GH=general health, V=Vitality, SF=Social functioning, RE=Role emotional, MH=Mental health

SBI and SFI showed strong positive correlation with MSBQ (r_s=0.731 and 0.690) and weak positive correlation with VAS for back pain (r_s =0.225 and 0.314). SBI showed moderate positive correlation with VAS for leg pain (r_s=0.628). These findings are consistent with a study conducted by Grovle L. et. al., [9] in which there was moderate correlation of Norwegian version of SBI and SFI with MSBQ and VAS for leg pain and weak positive correlation with VAS for back pain. There are 3 items in SBI and SFI which report the bothersomeness and frequency of radiating symptoms and 1 item which reports the bothersomeness and frequency of back pain which could be a reason for weak correlation of the indices with VAS for back pain. SFI showed weak positive correlation with VAS for leg pain (r_s=0.389) which is contradictory to the above mentioned study. It could be because VAS measures the intensity of pain whereas SFI measures the frequency of radiating symptoms; there are chances that the patients who frequently experienced episodes of pain may not necessarily have a high intensity.

SBI and SFI showed moderate negative correlation with Physical functioning subscales of SF36 (r_s=-0.63 and -0.678, respectively). This directly reflects the impact of bothersomeness and frequency of radiating symptoms on the performance of the physical activities. This is in accordance with the findings of Grovleet. al. [9]

There was strong negative correlation of SBI and moderate negative correlation of SFI with Role-Physical subscale of SF36 (r_s=-0.822 and -0.665 respectively). It can be implied that the patients who rated the symptoms as more bothersome and frequent on the two indices had more problems with work or daily activities.

There was moderate negative correlation of SBI and SFI with bodily pain subscale of SF36 (r_s=-0.608 and -0.598 respectively). Previous studies [8, 9] had

similar findings which were attributed to the fact that bodily pain subscale of SF36 evaluates the pain and its effect on the work.

SBI and SFI showed strong negative correlation with general health subscale of SF36 (r_s=-0.803 and -0.764 respectively). These findings are contradictory to previous studies. [8,9] High correlation found in the present study could be because more bothersome and frequent symptoms could lead to the patient's perception of the general health to be worse.

Table 3: Spearman rank correlation Coefficient between total scores of SFI with other health status measurements:

	SFI	Interpretation
MSBQ	0.69 (p<0.01)	Strong positive, significant
VAS (back)	0.314 (p<0.05)	Weak positive, significant
VAS (leg)	0.389 (p<0.05)	Weak positive, significant
SF36 subscales		
PF	-0.678 (p<0.01)	Moderate negative, significant
RP	-0.665 (p<0.01)	Moderate negative, significant
BP	-0.598 (p<0.01)	Moderate negative, significant
GH	-0.764 (p<0.01)	Strong negative, significant
V	-0.259 (p=0.054)	Weak negative, not significant
SF	-0.511 (p<0.01)	Moderate negative, significant
RE	-0.483 (p<0.01)	Moderate negative, significant
MH	-0.429 (p<0.01)	Moderate negative, significant

SFI=Sciatica Frequency Index, MSBQ=Maine Seattle Back Questionnaire, PF=Physical functioning, RP=Role-Physical, BP=bodily pain, GH=general health, V=Vitality, SF=Social functioning, RE=Role emotional, MH=Mental health

There was moderate negative correlation of SBI and weak negative correlation of SFI with vitality subscale of SF36 (r_s=-0.447 and -0.259 respectively). The bothersomeness of radiating symptoms could lead to the patient perceiving that one has less energy during the day and gets fatigued easily. However, the frequency of radiating symptoms did not show a statistically significant correlation with vitality subscale.

SBI and SFI showed moderate negative correlation with social functioning subscale (r_s=-0.659 and -0.511 respectively). The patients who rated their symptoms to be more bothersome and frequent had more participation restriction.

Role limitations-emotional and mental health subscales correlated moderately with SBI (r_s=-0.631 and -0.521 respectively) and SFI(-0.483 and -0.429 respectively). Previous studies showed weak correlations. [8, 9] Moderate correlation

found in the current study could be because many patients were adults who were employed and had mental stress related with their work and the radiating symptoms could add to the stress leading to lower scores on role limitations-emotional and mental health.

There was a moderate positive correlation between the scores of SBI and SFI (r_s=0.538) which is consistent with previous study. [9]

Sample size was 56 which resulted in respondent: item ratio of 14:1 which is acceptable. [20]

A limitation of this study was that the patients were selected from a private clinic. The findings of the study may not be valid for patients from primary care.

CONCLUSION

Gujarati versions of Sciatica Bothersomeness Index and Sciatica Frequency Index, which were successfully translated from English language, demonstrated excellent psychometric properties and are reliable and valid tools for assessing bothersomeness and frequency in Gujarati speaking patients with lumbosacral radiculopathy. They are easily administered and are recommended for use in clinical practice and research purposes.

REFERENCES
1. Hansson E and Hansson T. The cost-utility of lumbar disc herniation surgery. Eur Spine J. 2007; 16:329–337.
2. Heliovaara M, Impivaara O, Sievers K, Melkas T, Knekt P, Korpi J, and Aromaa A. Lumbar disc syndrome in Finland. J Epidemiol Commun Health. 1987; 41:251–258.

3. Younes M, Bejia I, Aguir Z, Letaief M, Hassen-Zrour S, Touzi M and Bergaoui N. Prevalence and risk factors of disk-related sciatica in an urban population in Tunisia. Joint Bone Spine. 2006; 73:538–542.
4. Konstantinou K and Dunn KM. Sciatica: Review of epidemiological studies and Prevalence estimates. Spine. 2008; 33(22):2464-2472.
5. Sharma SC, Singh R, Sharma AK, Mittal R: Incidence of low back pain in workage adults in rural North India, Medical Journal of India 2003; 57(4):145-147.
6. M. Krismer M. Van Tulder: Low back pain (nonspecific), Best practice and research clinical rheumatology 2007; 21(1):77-91.
7. Atlas SJ, Deyo R, Ancker M, Singer DE, Keller RB and Patrick DL. The Maine-Seattle Back Questionnaire: A 12-Item Disability Questionnaire for Evaluating Patients with Lumbar Sciatica or Stenosis. Results of a Derivation and Validation Cohort Analysis, Spine 2003; 28(16):1869-1876.
8. Patrick DL, Deyo RA, Atlas SJ, Singer DE, Chaplin A and Keller RB. Assessing health related Quality of Life in Patients With Sciatica. Spine 1995; 20(17):1899-1909.
9. Grovle L, Hanger AJ, Keller A, Natvig B, Broz JI, Grotle M. Reliability, validity and responsiveness of the Norwegian versions of the Maine-Seattle back questionnaire and the sciatica bothersomeness and frequency indices. Spine, 2008; 33: 2347-2353.
10. Billis E. Kapreli E, Krekoukias G, Zacharapoulos A, Stasinopoulos D, Spanos S, Strimpakos N. Cross-cultural validation of Sciatica Bothersomeness Index in a sample of Greek patients with Sciatica. Physiotherapy 2015, 101: 1eS1238-1eS1642.
11. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine. 2000; 25: 3186-91.
12. Guillemin F. Cross-cultural adaptation and validation of health status measures. Scand J Rheumatol. 1995; 24: 61-3.
13. Palisano RJ, Rosenbaum P. Content validity of the expanded and revised Gross Motor Function Classification System. Devl Med & Child Neurol. 2008,50:744-50.
14. Deyo RA, Diehr P, Patrick DL. Reproducibility and responsiveness of health status measures, statistics and strategies for evaluation. Control Clin Trials. 1991; 12: 142-58.
15. Cam C, Sakalli M. Validation of short forms of Incontinence Impact Questionnaire (IIQ-7) and the Urogenital Distress Inventory (UDI-6) in a Turkish population. Neurourol. Urodynam. 2007;26:129-33.
16. Ware JE, Snow KK, Kosinski M and Gandek B. SF-36 Health survey. Manual and Interpretation guide.
17. Ware JE and Sherbourne CD. The MOS 36-Item Short-Form Health Survey (SF-36): I. Conceptual Framework and Item Selection. Medical Care 1992; 30(6): 473-483.
18. Boonstra AM, Preuper SHR, Reneman MF, Posthumus JB, Stewart RE. Reliability and validity of the visual analogue scale for disability in patients with chronic musculoskeletal pain. Int J Rehabil Res. 2008; 31(2): 165-9.
19. Rowntree D. Statistics Without Tears: A primer for non-mathematicians. New York, NY: Charles and Scribner's Sons; 1981.
20. Nunnally J. Psychometric Theory. New York: McGraw-Hill; 1978.

******