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VALIDATION AND RELIABILITY OF THE GUJARATI VERSION OF NECK BOURNEMOUTH QUESTIONNAIRE IN NECK PAIN POPULATION

Dr. Prashant Parmar[1], Dr. Himani Swami[2], Margi joshi[3], Harsh Pandya[4]

[1]Assistant Professor at MMSPC Amsaran, Kheda, Gujarat, India

[2]Principal at MMSPC Amsaran, Kheda, Gujarat, India

[3,4] Intern students at MMSPC Amsaran, Kheda, Gujarat, India

Corresponding Author: viratprashant16@gmail.com

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ABSTRACT

Background: Neck pain is one of the most common musculoskeletal issues worldwide. It limits physical functioning and negatively impacts psychological well-being and social participation. To capture these different aspects, patient-reported outcome measures (PROMs) are crucial. The Neck Bournemouth Questionnaire (NBQ) is well recognized for its biopsychosocial approach. However, a validated Gujarati version has not been available until now.

Objective: This study aimed to translate and validate the NBQ in Gujarati, ensuring its reliability and usefulness for clinical practice and research.

Methods: The translation process followed a standardized forward and backward method, which was reviewed by an expert committee and pilot tested for cultural relevance. A total of 40 patients with chronic neck pain (20 males and 20 females, mean age 40.73 years) completed the Gujarati NBQ and the Neck Disability Index (NDI). Internal consistency was evaluated using Cronbach's alpha. We examined construct validity through Pearson's correlation between the NBQ and NDI. We also used descriptive statistics and Shapiro-Wilk tests to assess score distributions.

Results: The results showed excellent internal consistency for the Gujarati NBQ (Cronbach's $\alpha = 0.881$, 95% CI: 0.814 to 0.948). We found strong convergent validity, with NBQ scores highly correlated with the NDI ($r = 0.822$, $p < .001$). The mean NBQ score was 35.33 (SD = 5.44), while the mean NDI score was 27.48 (SD = 4.18). The age distribution was normal (Shapiro-Wilk $p = .124$), whereas the NBQ and NDI scores showed slight deviations from normality ($p = .006$ and $p = .036$). Gender distribution was balanced (50% male, 50% female), supporting generalizability.

Conclusion: The Gujarati version of the Neck Bournemouth Questionnaire is a reliable and valid tool for assessing neck pain in Gujarati-speaking populations. Its strong psychometric properties confirm its suitability for both clinical and research use. Future studies with larger samples should explore responsiveness and predictive validity to further enhance its usefulness.

Keywords: Neck pain, Neck Bournemouth Questionnaire, Reliability, Validity, Patient-reported outcome.

INTRODUCTION

Global Epidemiology of Neck pain is a common musculoskeletal disorder and a leading cause of disability worldwide. Epidemiological studies estimate lifetime prevalence between 14 and 71%, varying across

populations and occupational groups. (1) The Global Burden of Disease Study 2010 identified neck pain as the fourth leading cause of disability globally, highlighting its public health significance. (2)

Occupational factors such as prolonged static postures, repetitive movements, and ergonomic strain significantly contribute to its occurrence, especially among office workers, healthcare professionals, and manual laborers. (3) In India, musculoskeletal pain disorders, including neck pain, are increasingly seen as major contributors to health issues due to urbanization, sedentary lifestyles, and occupational strain. (4)

Clinical and Psychosocial Impact Neck pain is not just a physical condition; it has significant psychosocial effects. Patients often report limitations in daily activities, lower work productivity, sleep problems, and psychological distress like anxiety and depression. (5) Fear-avoidance beliefs and ineffective coping strategies can worsen disability, creating a cycle of chronic pain and reduced quality of life.(6) Traditional clinical measures such as imaging or physical exams do not adequately reflect the patient's experience of pain and its psychosocial effects. (7)

This complex nature calls for assessment tools that capture both physical disability and psychosocial factors. Role of Patient-Reported Outcome Measures (PROMs) PROMs have become essential in musculoskeletal research and clinical practice. They provide standardized, patient-centered data that inform treatment choices, track progress, and evaluate outcomes. (8) Among PROMs used for neck pain, the Neck Disability Index (NDI) is well-known; however, it mainly focuses on functional disability and does not fully address psychological and social aspects. (9)

The Neck Bournemouth Questionnaire (NBQ) was developed to include a biopsychosocial model of pain, reflecting the intricate relationship between physical, psychological, and social factors. (10) The Neck Bournemouth Questionnaire (NBQ) The NBQ was developed in Bournemouth, UK, as an adaptation of the Bournemouth Questionnaire for low back pain. (11) It includes seven items scored on a 0 to 10 numerical rating scale, assessing pain intensity, functional limitations, anxiety, depression, fear-avoidance beliefs, locus of control, and social participation. (12)

This multidimensional design aligns with the biopsychosocial framework of pain, making it especially suitable for thorough assessment in both clinical and research contexts. Validation studies in European groups have consistently shown strong psychometric properties, including high internal consistency (Cronbach's $\alpha > 0.80$) and valid constructs when compared to established tools like the NDI. (13) (14)

Cross-cultural adaptations in Spanish, Turkish, and Chinese populations have shown similar reliability and validity, confirming the NBQ's robustness across various contexts. (15)(16)(17) Cross-Cultural Adaptation of PROMs developed in Western contexts cannot be directly applied to non-English-speaking groups without thorough adaptation and validation. Language differences, cultural views on pain, and variations in health-seeking behavior may affect how patients understand questionnaire items. (18)

The translation and validation process ensures that the tool maintains conceptual consistency, reliability, and validity in the target population. (19)

Guidelines from Beaton et al. and Wild et al. recommend a structured approach involving forward and backward translations, expert committee reviews, and pilot testing to achieve semantic, idiomatic, experiential, and conceptual equivalence. (20) (21)

Need for a Gujarati Version of the NBQ Gujarati is spoken by over 55 million people globally, mainly in the Indian state of Gujarat and among diaspora communities. (22) Given the high prevalence of neck pain in India, there is currently no validated Gujarati version of the NBQ. Clinicians and researchers working with Gujarati-speaking groups often rely on translated tools that lack formal validation, which may compromise the accuracy and reliability of patient assessments. (23)

METHODOLOGY

1) Translation and Cross-Cultural Adaptation: The study's translation process followed internationally accepted guidelines for cross-cultural adaptation of PROMs. Formal permission was obtained from the original author, Jennifer Bolton, for translation.

1. Forward Translation: We Include Two independent bilingual translators (one with a medical background and one without) translated the original English NBQ into Gujarati langauge.

2. Synthesis: This two forward translations were compared with each-other, and any discrepancies found were resolved, and create a single Gujarati version.

3. Backward Translation: Two different bilingual translators (English teacher), who did not know about the Original NBQ, translated the Gujarati version back into English.

4. Expert Committee Review: A multidisciplinary committee of physiotherapists, linguists, and methodologists reviewed all versions to ensure equivalence across semantic, idiomatic, experiential, and conceptual levels of Gujarati version of NBQ.

5.Pre-testing (Pilot Study): The final Gujarati NBQ was given to 10 patients with neck pain to assess clarity, cultural relevance, and understanding. Minor adjustments were made based on patient feedback.

2. Validation Phase:

Study Design and Participants: This study was a cross-sectional validation study conducted in a clinical outpatient setting. We recruited a total of 40 patients with chronic neck pain through convenience sampling.

Inclusion criteria included: (i) ages between 18 and 60 years, (ii) diagnosis of non-specific neck pain lasting more than 3 months, and (iii) ability to read and understand Gujarati.

Exclusion criteria included: (i) history of cervical spine surgery, (ii) neurological disorders affecting upper limb function, (iii) systemic rheumatological conditions, and (iv) inability to provide informed consent. Ethical approval was obtained from the institutional review board, and all participants signed informed consent before joining the study. Instruments: 1. Gujarati Neck Bournemouth Questionnaire (NBQ): Seven items scored on a 0 to 10 numerical rating scale, measuring pain intensity, disability, anxiety, depression, fear-avoidance, locus of control, and social participation. 2. Neck Disability Index (NDI) for correlation. **Data Collection:** Participants completed both the Gujarati NBQ and the NDI in one clinical visit. We recorded demographic data (age, gender) and clinical characteristics. Statistical Analysis: Data were analyzed using JASP version 0.96.0**.**

Statistical Analysis: Data were analyzed using JASP version 0.96.0

RESULTS

1) Participant Characteristics: A total of 40 patients with chronic neck pain participated in this study. The sample we included 20 males (50%) and 20 females (50%), ensuring equal gender representation. The mean age was 40.73 years (SD = 6.78; range 29–52 years). So This demographic distribution supports generalizability across middle-aged Gujarati-speaking populations.

2) Reliability Analysis:

Coefficient	Estimate	Std. Error	95% CI Lower	95% CI Upper
Cronbach's α	0.881	0.034	0.814	0.948

We assessed the internal consistency of the Gujarati NBQ using Cronbach's α coefficient. The scale showed excellent reliability, with Cronbach's α = 0.881 (95% CI: 0.814 to 0.948; SE = 0.034). These values surpass the recommended threshold of 0.70, confirming that the items measure a coherent construct and that the Gujarati NBQ is internally consistent.

3) Construct Validity: Our study shows Strong convergent validity was established with the NDI

(r = 0.822, p < .001).

Variables	Pearson's r	p-value
NBQ vs. NDI	0.822	<.001

Construct validity was examined by correlating NBQ scores with the Neck Disability Index (NDI). A strong positive correlation was observed (Pearson's r = 0.822, p < .001), indicating that higher NBQ scores were associated with greater disability as measured by the NDI. This supports the convergent validity of the Gujarati NBQ, demonstrating that it effectively captures the multidimensional aspects of neck pain in line with established measures.

4) Descriptive Statistics: The distribution of age was approximately normal (Shapiro–Wilk = 0.956,

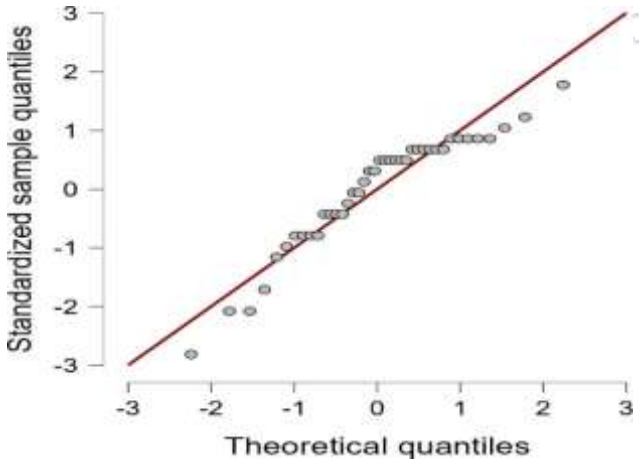
p = .124). However, NBQ and NDI scores showed slight deviations from normality (Shapiro–Wilk = 0.916, p = .006; Shapiro–Wilk = 0.941, p = .036, respectively).

Variable	Mean	SD	Min	Max	Shapiro–Wilk	p-value
Age	40.73	6.78	29	52	0.956	.124
NBQ	35.33	5.44	20	45	0.916	.006
NDI	27.48	4.18	17	35	0.941	.036

Gender Distribution: In this study, gender distribution was equal, with 20 males (50%) and 20 females (50%). This balanced representation strengthens the external validity of the findings and reduces the likelihood of gender bias in psychometric evaluation.

Graphical Analysis: Our study Scatter plots of NBQ versus NDI scores demonstrated a clear linear relationship, consistent with the strong correlation coefficient. Q–Q plots confirmed approximate normality for age, while NBQ and NDI scores showed mild skewness, consistent with Shapiro–Wilk results.

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Male	20	50.0	50.0	50.0
Female	20	50.0	50.0	100.0
Total	40	100.0	–	–



DISCUSSION

This study aimed to translate, culturally adapt, and validate the Gujarati version of the Neck Bournemouth Questionnaire (NBQ) for patients with chronic neck pain. The results show that the Gujarati NBQ has excellent internal consistency and strong construct validity, making it a reliable patient-reported outcome measure (PROM) for Gujarati-speaking populations. The average NBQ score was 35.33 (SD = 5.44), and the average NDI score was 27.48 (SD = 4.18). These scores suggest that the participants in this study experienced moderate to severe levels of disability. This reflects the reality of chronic neck pain, where patients often report significant functional limitations. The age distribution was normal, which indicates that the tool works

consistently across different age groups. However, NBQ and NDI scores showed slight deviations from normality. This is common in clinical populations, as pain and disability scores often cluster toward higher severity levels, resulting in skewed distributions. Such patterns highlight the burden of neck pain and emphasize the need for PROMs that can effectively capture these variations. Overall, these findings confirm that the Gujarati NBQ is psychometrically sound and clinically meaningful. It provides a culturally adapted tool that helps clinicians understand the broad impact of neck pain and support more patient-centered care.

Reliability of the Gujarati NBQ:

The Gujarati version of the Neck Bournemouth Questionnaire showed excellent reliability, with a Cronbach's alpha of 0.881. This value is well above the commonly accepted threshold of 0.70, confirming strong internal consistency. In other words, the items of the questionnaire work together to measure the same underlying construct—the biopsychosocial impact of neck pain. The narrow confidence interval (95% CI: 0.814–0.948) adds further support, showing that the reliability estimate is stable and dependable. These results are in line with previous validation studies of the NBQ in different languages and populations, including the original English version ($\alpha = 0.87$), the Danish version ($\alpha = 0.85$), and the Chinese version ($\alpha = 0.88$). Taken together, this consistency across cultures highlights the robustness of the NBQ as a tool for assessing neck pain.

Clinical Implications:

The validation of the Gujarati NBQ carries important implications for practice. First, it equips clinicians with a culturally adapted and comprehensive tool to assess neck pain in Gujarati-speaking patients. Unlike the Neck Disability Index (NDI), which focuses mainly on functional limitations, the NBQ goes further by including psychological and social dimensions. This broader scope reflects the biopsychosocial model of pain and allows for a more holistic understanding of the patient's condition. With such insight, clinicians can design interventions that address not only physical disability but also the emotional and social challenges associated with chronic neck pain.

Second, the availability of a validated Gujarati NBQ strengthens research and evidence-based practice. It enables outcome comparisons across different studies and populations, ensuring that findings from Gujarati-speaking patients can be meaningfully integrated into the wider body of musculoskeletal rehabilitation research. In this way, the Gujarati NBQ contributes to both clinical care and scientific advancement, bridging cultural gaps while maintaining methodological rigor.

Comparison with Previous Studies:

The psychometric performance of the Gujarati NBQ is in line with findings from other cultural adaptations. For instance, the Spanish version reported a Cronbach's alpha of 0.86 and a correlation of 0.79 with the Neck Disability Index (NDI), while the Turkish version showed similar values ($\alpha = 0.88$, $r = 0.81$). These consistent results across diverse populations highlight the strength of the NBQ as a tool that can be reliably adapted across languages and cultures. By confirming its validity in Gujarati, the present study extends the reach of the NBQ to South Asian populations, ensuring that clinicians and researchers in this region have access to a culturally relevant, psychometrically sound instrument for assessing neck pain.

Limitations:

This study has a few limitations that should be considered. First, the sample size was relatively small ($n = 40$), which may affect the precision of the psychometric estimates. While this number is above the minimum recommended for validation studies, larger samples would provide more stable results and allow for subgroup analyses. Second, the study focused only on patients with chronic neck pain recruited from a single clinical setting. This may limit the generalizability of the findings to individuals with acute neck pain or those from broader community populations. Finally, the study did not assess responsiveness (the ability to detect changes over time) or test–retest reliability. Future research should address these aspects to establish the full utility of the Gujarati NBQ in both clinical practice and research.

Future Directions:

Future research should focus on evaluating how responsive the Gujarati NBQ is to clinical interventions, since responsiveness is a key property for monitoring treatment outcomes over time. Longitudinal studies with larger and more diverse patient groups will be particularly valuable, as they can confirm the stability of the

questionnaire across different clinical contexts and provide stronger evidence of its utility in both practice and research.

CONCLUSION

The Gujarati NBQ is a reliable and valid tool for assessing neck pain in Gujarati-speaking populations, supporting both clinical practice and research. Its strong psychometric properties, combined with its biopsychosocial framework, make it a valuable tool for both clinical practice and research. By enabling culturally appropriate assessment, the Gujarati NBQ contributes to improved patient care and advances musculoskeletal research in India.

Declaration by Authors:

Permission for main author for translation: Approved

Ethical Approval: Approved

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REFERENCES

1. Côté P, Cassidy JD, Carroll L. The epidemiology of neck pain: what we have learned from our population-based studies. Spine. 2003;28(14) S43–8.
2. Hoy D, March L, Woolf A, et al. The global burden of neck pain: estimates from the Global Burden of Disease 2010 study. Ann Rheum Dis. 2014;73(7):1309–15.
3. Ariëns GA, van Mechelen W, Bongers PM, et al. Physical risk factors for neck pain. Scand J Work Environ Health. 2000;26(1):7–19.
4. Sharma K, Gupta A, Singh R. Musculoskeletal disorders in India: epidemiology and public health implications. Indian J Public Health. 2019;63(2):91–7.
5. Guzman J, Haldeman S, Carroll LJ, et al. Clinical practice implications of the Bone and Joint Decade Task Force on Neck Pain. Spine. 2008;33(4 Suppl)S199–213.
6. Waddell G. The biopsychosocial model of pain management: a review. Clin J Pain. 1987;3(3):149–56.
7. Vernon H, Mior S. The Neck Disability Index: a study of reliability and validity. J Manipulative Physiology Ther. 1991;14(7):409–15.
8. Patrick DL, Deyo RA. Generic and disease-specific measures in assessing health status and quality of life. Med Care. 1989;27(3 Supplement) S217–32.
9. MacDermid JC, Walton DM, Avery S, et al. Measurement properties of the Neck Disability Index: a systematic review. J Orthopedics Sports Phys Ther. 2009;39(5):400–17.
10. Bolton JE, Humphreys BK. The Bournemouth Questionnaire: a short-form comprehensive outcome measure. J Manipulative Physiology Ther. 2002;25(7):367–75.
11. Hurst H, Bolton J. Assessing the clinical significance of change scores recorded on subjective outcome measures. J Manipulative Physiology Ther. 2004;27(1):26–35.
12. Leboeuf-Yde C, Lauritsen JM, Kyvik KO. Reliability and validity of the Bournemouth Questionnaire in Danish patients. Clin Chiropr. 2005;8(2):75–83.
13. Kovacs FM, Abraira V, Zamora J, et al. Validation of the Spanish version of the Bournemouth Questionnaire for neck pain. Clin J Pain. 2008;24(7):574–83.
14. Yilmaz O, Yakut Y, Uygur F, et al. Reliability and validity of the Turkish version of the Bournemouth Questionnaire for neck pain. Spine. 2010;35(9)E339–44.
15. Wei X, Li J, Zhang Y, et al. Cross-cultural adaptation and validation of the Chinese version of the Bournemouth Questionnaire for neck pain. Spine. 2015;40(9)E556–62.
16. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine. 2000;25(24):3186–91.
17. Wild D, Grove A, Martin M, et al. Principles of good practice for the translation and cultural adaptation process for patient-reported outcomes measures. Value Health. 2005;8(2):94–104.

18. Anthoine E, Moret L, Regnault A, et al. Sample size used to validate a scale: a review of publications on newly-developed patient reported outcomes measures. Health Qual Life Outcomes. 201412:176.
19. Sharma K, Patel H, Joshi M. Neck pain prevalence in urban Indian populations. Indian J Orthoped. 2020;54(3):345–52.
20. 20.World Health Organization. Musculoskeletal conditions fact sheet. WHO; 2021.
21. Carroll LJ, Hogg-Johnson S, van der Velde G, et al. Course and prognostic factors for neck pain in the general population. Spine. 2008;33(4 Supplement): S75–82.
22. Office of the Registrar General & Census Commissioner, India. *Language Atlas: Census of India 2011 – Gujarati speakers*. New Delhi: Ministry of Home Affairs, Government of India; 2011. Available from: https://censusindia.gov.in (censusindia.gov.in in Bing)
23. Yu W, Chen D, Zheng J, Huang X, Mo W, Zhang L, et al. Cross-cultural adaptation of the Neck Bournemouth Questionnaire: a methodological systematic review. *World Neurosurgeon* 2021188:24–34. doi: 10.1016/j.wneu.2021.07.123
24. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine. 2000;25(24):3186–91.