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Original Article

Translation, Cross-cultural Adaptation and Validation of the Neck Bournemouth Questionnaire: Persian Version

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Abstract
Introduction: The Neck Bournemouth Questionnaire (NBQ) is being used widely in various countries. This study evaluated the validity and reliability of the Persian version of NBQ.
Methods: This methodological study investigated 170 patients with chronic neck pain (NP). The psychometric properties of NBQ were evaluated in two stages. First, the standard scale was translated based on Guillemin's guidelines for cross-cultural adaption and face validity tested in a pilot group (N=25). Second, it was conducted on a sample of 170 diverse chronic pain patients. Construct validity was determined with convergent validity by short-form McGill pain questionnaire. Then, the reliability was confirmed using Cronbach's alpha and the intraclass correlation coefficient.
Results: The instrument demonstrated a good face validity and the participants made minor changes. A slight change was applied on content validity. In construct validity, Pearson's correlation coefficient was 0.85, which was statistically significant and showed strong correlation. A Cronbach's alpha of 0.87 was obtained. This confirmed the remarkable internal consistency and stability (0.92).
Conclusion: The Persian version of NBQ showed a good internal consistency and reliability and it could be considered as a valuable tool for assessing patients with cervical pain in Iranian population.

Introduction

Work-related musculoskeletal disorders are among major occupational health hazards in different countries,[1] especially developing and industrialized countries,[2] with an increasing prevalence due to sedentary and changing lifestyle.[3,4] Not only do these problems adversely affect people's body and spirit, but they also have significantly on the quality of life and reduce their efficiency,[5] cause half of the work absenteeism[6] and double the use of health services.[1]

Neck pain (NP) is one of the most common musculoskeletal disorders,[7] the lifetime prevalence of NP for adults across different countries has been reported to range from 14.2% to 71.0%,[8] but it experienced by 70% of the Iranian population at least once in their lives.[3] It is one of the four most common musculoskeletal problems reported in England, where almost one-fifth of the adults have reported NP over the last year.[9]

NP is a multifactorial problem, in which, various physical, psychological, social and personal factors are involved.[10] Hence, the best way to define NP is through a biopsychosocial model, which includes pain, disability, cognitive and affective domains.[11] Self-administered questionnaires as common as used for assessing the health status or outcome of treatment in patients with NP by physicians. It is useful to quantify the level of disability, pain perception, and relevant outcomes.

The Neck Bournemouth Questionnaire (NBQ) is a global tool designed by Bolton and Humphreys[11] based on biopsychosocial model, and includes questions about pain and disability as well as questions relating to the cognitive model of pain.[12]

The NBQ is a multidimensional instrument originally created in English that has been shown to be valid, reliable and responsive for use in the clinical and research settings.[11] In order to use the NBQ in a Persian speaking patient population it is not enough to just translate the items well linguistically, because that does not guarantee similar measurement properties.[13] The questionnaire also has to be adapted cross-culturally, which means employing

a process that looks at both language and cultural issues relevant to the Persian speaking population in which the questionnaire will be used.[14] The NBQ is being used widely in various countries. As it is only available in English, French, Dutch, German and Italian.[11,12,15-17] Cronbach's alpha coefficients for global item homogeneity of the NBQ in several countries were 0.87, 0.91, 0.79, 0.87 and 0.89 respectively.

The main strength of this questionnaire is an interesting and specific assessment tool for NP patients because it is the only questionnaire based on the biopsychosocial illness model. Also, this includes a one-page questionnaire that takes less than five minutes to complete; that it could be used in outpatient settings, such as clinics providing manual therapy. As such, any clinician or re-searcher who needs to succinctly evaluate NP in a context that considers the biological, psychological and social dimensions would prefer this test to other validated tools based on pain and disability evaluation. Thus, for the first time validated as a new questionnaire in Iran. The purpose of this study was to cross-culturally adaptation and validation of this questionnaire in a sample of Iranian chronic NP outpatients.

Materials and Methods

The present study is a methodological investigation that testing of the NBQ was carried out in 170 adult patients with chronic NP. The sample size was obtained by using *G*Power software* version *3.0.10* and considering the previous studies as sample[18] with power = 0.9, $\beta = 0.10$ and $\alpha = 0.05$, and $r = 0.4$. They were admitted to the pain clinic of Baqiyatallah teaching hospital. The NBQ includes seven independent questions, each representing a different dimension of the pain experience. Each question is scored on an 11-point numerical rating scale (0–10). The seven items include pain intensity, functional status in daily living and social activities, affective dimensions of anxiety and depression, cognitive aspects of fear-avoidance belief and pain locus of control.[15]

After obtaining the required permission from developer (Professor JE Bolton), a standard translation of NBQ perceived based on the guidelines of Beaton et al.[14]

The entire process is made up of 6 steps *can be explained* as *follows:* Stage 1: (Forward translation), two official translators (T1 and T2) translated the NBQ from English into Persian. Stage 2: (Synthesis translations), then it was discussed in a committee of translators and physicians expert in pain management, including physical medicine, neurosurgery, neurology, rheumatology, orthopedics, and anesthesiology. After reaching consensus on translated words, Stage 3: (Backward translation), two other English-speaking translators (BT1 and BT2), who were totally blind to the original questionnaire, translated the Iranian version back to English. Stage 4: (Expert committee review), the divergence between the translations was discussed and resolved by the expert committee of physicians and consultants. Stage 5: (Face validity testing in 25 patients), finally, the Persian version of the scale was revised grammatically by expert translators and presented for the evaluation of psychometric properties. If we observed that some words were difficult for patients to comprehend, we provided short descriptions to help better describe the pain qualities. Stage 6: (Submission and documentation to committee for appraisal), which showed in Figure 1.

We used a convenience sampling method for case selection from a diverse group of chronic NP patients who were referred to our tertiary pain and rehabilitation clinic over four months. The inclusion criteria were: having past history of chronic NP (more than six months), age over 20, gender (male and female), and ability to speak and understand Persian language, and consent to participate in the study. The exclusion criteria were: patients who had received any sort of treatment in the last 6 months, intellectual disability and dementia.

After data was gathered, the descriptive analysis, validity, and reliability were analyzed by SPSS software (version 13). The demographic data of the patients were described by the use of mean and standard deviations. The internal consistency of the NBQ, which measures the degree to which items that make up the total score are all measuring the same underlying attribute, was assessed using Cronbach alpha.[12] External construct validity shows the extent to which the NBQ's scores concord with the scores of other instruments measuring the same theoretical hypotheses of the concepts under consideration.[12] This was done with Pearson correlation coefficient, comparing the total scores of the Persian version of NBQ with the total score of short-form McGill pain questionnaire.

The ethics committee of Baqiyatallah University of Medical Sciences has approved the proposal. This article is related to the professional medical doctoral dissertation with registration number (1168) in Baqiyatallah University of Medical Sciences. It has reviewed the study and raised no objections from an ethical point of view. Permission to carry out the study was first obtained from professor Bolton, the principle designer of the NBQ. All participants were informed about the purpose of the study and gave a

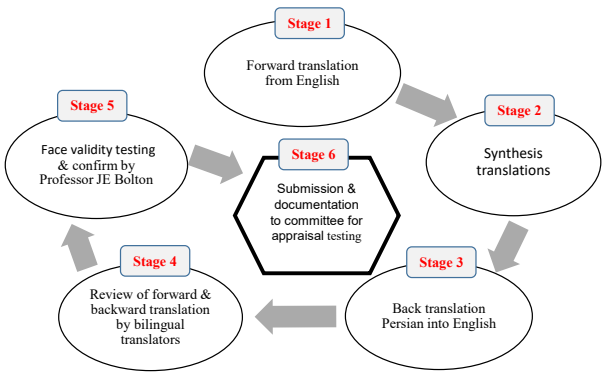

Figure 1. Flowchart of translation phases

written consent for participation. They had the possibility to withdraw or interrupt their participation at any time.

Results

Of the 170 neck patients who completed the study, 104 (61.4%) were male and 66 (38.6%) were female with a mean age of 47.25 (SD = 7.21) years. There was no significant age difference between the genders ($P > 0.05$). The mean total score for the Persian version of NBQ was 41.87 (SD = 7.7), and also for the short-form McGill questionnaire the mean total score was 45.24 (SD = 8.9). (Table 1) Results of the chi-square test showed that gender, education level and marital status had no significant relationship with NBQ's scores.

Face validity was determined in a qualitative manner, and the NBQ was presented to 25 adult patients with chronic headache and migraine. This step was essential to ensuring the scale's quality and obtaining appropriate feedback from patients while they answered the translated questions minor changes were agreed and the pre-final form was modified to include these changes with consensus. Content validity was qualitatively assessed by several specialists and found to be at an appropriate level. The content validity ratio (CVR)and content validity index (CVI) scores for the NBQ were 0.88 and 0.92, respectively.

Construct validity, was determined with convergent validity by short-form McGill pain questionnaire. We assessed construct validity by calculating the correlation between the Persian version of NBQ results and that of a comparative external measure, the McGill pain questionnaire. The Iranian Short-form McGill pain questionnaire has a valid and reliable Persian version (I-SF-MPQ).[19] The Pearson correlation between NBQ total scores and short-form McGill questionnaire total score was 0.85 ($P = 0.001$) which indicates a strong correlation between Persian version of NBQ and I-SF-MPQ.

Table 2 shows the item-corrected total correlations for the Persian version of the NBQ, with all values well above the cut-off point of 0.2,[20] indicating that all seven scales contribute to the overall score. The study revealed that the intrarater reliability of the severity scores, assessed by Cronbach's alpha, was 0.87 ($P = 0.001$), in our study, the intraclass correlation coefficient was 0.92 (95% confidence interval, 0.79–0.94).

Table 1. Demographic and clinical characteristics of patients (n = 170)

Variables		No. (%)
Sex	Female	66 (38.6)
	Male	104 (61.4)
Age (y)		47.25 (7.21)[a]
Married status	Single	43 (25)
	Married	127 (75)
Education	Primary	31 (18)
	Secondary	103 (61)
	High	36 (21)
Occupation	Office worker	123 (73)
	Manager	21 (12)
	Student	26 (15)
Pain duration (day)	1-14	87 (51)
	Over 14	83 (49)

[a] Mean (SD).

Discussion

The purpose of this study was to translate and test a Persian version of the NBQ for use Iranian clinicians and researchers working in the field of pain. The most common questionnaires used for NP in the number of studies included: The Neck Pain Disability Index (NDI),[21] The Northwick Park Neck Pain Questionnaire,[22] The Copenhagen Neck Functional Disability Scale,[23] The Neck Pain and Disability Scale (NPAD)[18] and The Bournemouth Questionnaire for Neck Pain.[11] The NBQ is form multidimensional instrument developed from the bio psychosocial model and contains as follows items: pain intensity, disability in activities of daily living in social activities, the emotional dimensions of anxiety and depression, the cognitive aspects of fear-avoidance behavior and pain locus of control.[11]

The NBQ has been cross-culturally translated into several languages with good internal consistency and construct validity to evaluate low back pain and NP.[24] Recently, the version of this instrument has been translated and validated in various languages such as Arabic,[25,26] Brazilian,[27] Turkish,[28,29] French,[15] Dutch,[16] German,[12] and Italian.[17] The 6-step translation and cross cultural adaptation process after Beaton et al.,[14] was used in this study and included forward and back translations, validation by an expert committee, face validity and testing in NP patients followed by statistical analysis. The cross-cultural adaptation of the NBQ in Iranian patients showed the absence of any major difficulty during the fourth and back translation processes. This finding is consistent with the results of other previous studies in other countries.[12,17] In this study, the internal consistency was strong for all 7 items of the NBQ with Cronbach alpha of 0.87. The

Table 2. Internal consistency of the Neck Bournemouth Questionnaire (Persian version)

Item-corrected total correlations								
Variable	**Pearson's r**							**Cronbach's alpha**
Domain (item)	1	2	3	4	5	6	7	Total score
Value	0.82	0.81	0.83	0.80	0.88	0.82	0.93	0.87

internal consistency of NBQ was higher than the NDI.[30] This instrument compared to other instruments that used in different countries was considered coefficient alpha.

Construct validity is an important feature of questionnaires that measures the confirmation with the theoretical construct of the studied phenomenon.[31] There was an acceptable correlation was found between the NBQ and the McGill pain questionnaire in our study. The study revealed a good reliability and the strengths of the present study include gold standard translation approach and an excellent sample size. This is also in agreement with the other study conducted by Leonard et al.,[32] Adelmanesh et al.,[19] Geri et al., [17] and Schmitt et al.[16] The results of this study demonstrate that the psychometric properties of the NBQ Iranian translation are sufficiently adequate, thus its use with NP patients.

One main limitation of this study is the fact that all testing was done on chronic NP patients referred to the pain *clinic* of *Baqiyatallah hospital* in the city of Tehran. It is suggested that further studies be conducted in other parts of the country as comparative investigations between patients and healthy people. The results obtained from the application of this scale need to be evaluated nationwide. An additional limitation is that patients were not selected by the random sampling method and thus may not be representative of Iranian adults with acute NP. Further psychometric studies in children populations are needed.

Conclusion

According to the results of present study, the Persian version of NBQ is simple and applicable questionnaire which was developed with appropriate psychometric properties. This scale is privileged with a simple scoring system, good validity and reliability and useful instrument in screening and assessment of patients with cervical pain in Iranian population. It can be used by Iranian clinicians and researchers working in the field of pain to communicate internationally.

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Ethical Issues

The required permissions for this study were acquired from both patients and the research ethics committee. In addition, all subjects were informed of the nature and the purpose of study. All information was kept confidential, and the authors' rights were recognized when using previously published texts.

Conflict of Interest

The authors declare that they have no competing interests.

Research Highlights

What is the current knowledge?

NP is a debilitating disease with high burden in different countries. Use of appropriate tools to evaluate NP helps healthcare provider for better disease management.

What is new here?

Persian version of Neck Bournemouth -7 item was good validity and reliability as well as applicability.

-This is a good scale for assessing patients with cervical pain in Iranian population.

-This is a feasible scale for using clinicians to investigation rate of pain in patients with chronic cervicalgia.

Authors' Contributions

AAD was the main investigator and supervisor, write up, and revised the final manuscript. MMS and SARM contributed to the study design and data collection. MSN and VS helped as a consultant in all parts of the study, especially proposal writing, and revising manuscript. All authors read and approved the final manuscript.

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