Psychometric Validation of the Cross-culturally Adapted Traditional Chinese Version of the Back Beliefs Questionnaire (BBQ) and Fear Avoidance Beliefs Questionnaire (FABQ)

Abstract

Purpose: To translate and cross-culturally adapt the Back Beliefs Questionnaire (BBQ) and Fear Avoidance Beliefs Questionnaire (FABQ) into traditional Chinese for their use in patients experiencing low back pain (LBP)

Methods: This was a prospective questionnaire translation and psychometric validation of the BBQ and FABQ. Double forward and single back translation of the BBQ and FABQ was performed with cross-cultural adaptation. The translated questionnaires were reviewed by a panel of healthcare professionals. The final version of the translated, traditional Chinese BBQ and FABQ were then administered to Chinese patients with a history of back pain. Upon completion, the patients also filled in the Traditional Chinese (Hong Kong) versions of the Oswestry Disability Index (ODI), the Short Form 12 version 2 (SF-12v2) questionnaires and visual analogue scale (VAS) for LBP. Construct validity was assessed using Spearman's correlation test against the subscales and domains with similar constructs. Internal consistency was assessed by Cronbach's alpha (α). Sensitivity of the BBQ and FABQ was

determined by known group comparisons.

Results: A total of 100 patients were recruited. Both BBQ and FABQ demonstrated an excellent overall internal consistency (α = 0.810 and 0.859 respectively). The BBQ scores significantly correlated with ODI scores, VAS-LBP and *all* domains of SF-12v2 ($p<0.01$-0.05); whereas only FABQ Work subscale correlated with ODI scores ($p<0.01$) and VAS-LBP ($p<0.05$). Both FABQ subscales correlated with only specific domains of SF-12v2 ($p<0.01$-0.05). The translated BBQ was sensitive to patients with or without a history of trauma relating to spine/accidental fall. The FABQ-W was sensitive to difference between patients with acute versus chronic back pain, and in patients with or without a history of spinal tumour or infection.

Conclusions: Both the adapted BBQ and FABQ (Traditional Chinese–Hong Kong) were demonstrated to have satisfactory psychometric properties, with adequate internal consistencies, construct validity and sensitivity to the certain clinical parameters. These findings verify the use of both questionnaires in Chinese patients with LBP, and provide instruments for future investigations regarding back pain, their management and treatment outcomes.

Keywords: Psychometrics; low back pain; BBQ; FABQ

Level of evidence: 2

Introduction

Low Back Pain (LBP) affects most people at some stage in their lives, and it is one of the commonest causes of disability.[1] From the clinician's viewpoint, LBP can be resulted from various aetiological factors, be it pathological in nature and/or a consequence of physical factors such as injury or exertion, or mental strain. However, LBP can be beyond just a medical entity from patient's perspective, as the pain can lead to absence from work and negatively impacts health-related quality of life (HRQOL).[2] Such low back disability conjures up the low back trouble, which as defined by Symonds *et al*[3] consists of two separate components, the clinical syndrome and the disability that is predominantly controlled by psychosocial factors.[4]

Therefore, in order to gain comprehensive understanding of low back pain and its impact, psychosocial factors like the beliefs and attitudes of patients towards their own experience of LBP are important, in addition to pain aetiology and severity. Patient-orientated instruments specifically focusing on back pain beliefs are thus required for investigating various beliefs about pain and disability. The Back Beliefs Questionnaire (BBQ) was developed to measure an individual's beliefs towards various inevitable consequences of the future as a result of low back trouble.[3, 5] It has been translated and cross-culturally adapted in Saudi Arabia and Iran, [6, 7] and in China where it was specifically validated only for its use by healthcare

professionals.[8] Another self-rated belief instrument is the Fear Avoidance Beliefs Questionnaire (FABQ). Fear avoidance beliefs, in fact, are psychological risk factors for LBP to persist and develop into a chronic nature.[9] This is based on the fear-avoidance model, which explains how acute/subacute pain patients might be transitioned into a chronic state of depression, disability, and inactivity over time.[10] The FABQ were culturally adapted in a large number of countries,[11-20] for the purpose of not only its use in local population, but more importantly to seek its validity in the assessment of treatment efficacy and outcome.[21]

As these beliefs questionnaires are structured to gain psychosocial data using a list of back pain-related statements, it is of particular importance to adapt such tool into colloquial local language in order to effectively capture patients' perception of the back pain trouble. Hence the aim of this study is to translate and culturally-adapting the BBQ and FABQ into traditional Chinese, and to validate its use in the patients of Chinese ethnicity with LBP.

Materials and Methods

Subjects and Setting

Consecutive Chinese patients attending a specialty back pain outpatient clinic during the period of April 2016 and November 2016 were recruited. Exclusion criteria included illiterate patients, or those who could not communicate either verbally in Cantonese and/or understand traditional Chinese characters in writing. A sample size of 100 was planned for recruitment,

as sample sizes of 50 to 100 is considered good to excellent as according to the COSMIN checklist, an international consensus quality assessment of psychometric evaluation.[22] Ethics approval was obtained from the institutional review board.

Subjects who consented were invited to fill in the translated BBQ (Traditional Chinese – Hong Kong) and FABQ (Traditional Chinese – Hong Kong). Upon completion, the patients were also asked to complete the Traditional Chinese (Hong Kong) version of the Oswestry Disability Index (ODI) and the Short term 12-item Health Survey version 2 (SF-12v2) questionnaires. A visual analogue scale (VAS) was used to ask patients to rate the degree of their LBP on the day.

At the time of visit, demographic and clinical data were collected. Episodes of LBP was reported as acute (<6 weeks duration) or chronic (≥12 weeks duration),[23] as well as only back pain or with radiating leg pain and numbness. Diagnoses included spinal deformities (scoliosis, spondylolisthesis), disc degeneration, and lumbar spondylosis (degeneration with osteophytes). Histories of any previous spine surgery, any previous trauma relating to spine or accidental fall were also extracted.

Translation and Cross-culture Adaptation

By following one of the internationally accepted translation techniques,[24] the original English version of BBQ and FABQ were translated into traditional Chinese (Hong Kong).

This consisted of double forward translation and single back translation by independent professional translators, who are native speakers of Cantonese, and can communicate using local terms in the written form of traditional Chinese used in Hong Kong. After the first forward translation, the translated traditional Chinese version of BBQ and FABQ was reviewed by a panel of local healthcare professionals (inclusive of spine specialists and allied health professionals). It was then back-translated into English by a professional translator who had no prior knowledge of the original questionnaire. The final forward translation was performed by an independent translator. The final version of the translated and culturally-adapted BBQ and FABQ in traditional Chinese (Hong Kong) was finalized and approved by the review panel. (**Appendix 1**)

Study Instruments

Back Beliefs Questionnaire (BBQ)

BBQ was developed to focus on various inevitable aspects of LBP. It is comprised of one scale using a sub-set of 9 statements, together with another 5 statements being the distractors.[3] A 5-point Likert scale was used for each statement, ranging from 1 (strongly disagree) to 5 (strongly agree). The scale is then calculated by reversing and summation of the 9 scores, with a possible score ranged between 9 to 45. More pessimistic beliefs about back pain are indicated by lower scores.

Fear Avoidance Beliefs Questionnaire (FABQ)

This questionnaire was developed based on theories of fear and avoidance behaviour. The FABQ quantifies patients' fear of pain and consequent avoidance of physical activity because of their fear.[4, 25] It consists of a total of 16 items, of which each item scored from 0 to 6. There are two subscales: the Work Subscales (FABQ-W) and the Physical Activity Subscale (FABQ-PA), with seven and four items respectively and 5 remaining items as ineffective. These two subscales allow the identification of patient's beliefs on how work and physical activity affect their current LBP, and they were demonstrated to be reliable and valid for the measurement of fear-avoidance beliefs.[4] Greater fear and avoidance beliefs are represented by the higher scores of the FABQ.

In addition, there was a five-point Likert scale immediately upon completion of the translated BBQ and FABQ, with 5 levels of responses: Strongly Agree, Agree, Neither agree/disagree, Disagree, Strongly Disagree. This allowed patients to rate the clarity and understanding of translated questionnaires.

Oswestry Disability Index (ODI) Questionnaire

The Oswestry Low Back Pain Disability Questionnaire is an outcome measure designed to assess limitations of various activities of daily living, by which the ODI is derived. The

questionnaire consists of ten sections, of which each is scored on a 0–5 scale, with increasing level of disability. The index is calculated by dividing the summed score by the total possible score and expressed as a percentage. It is considered the 'gold standard' of low back functional outcome tools, and is used to measure patient's permanent functional disability.[26, 27] The use of ODI in the Hong Kong Chinese population has been validated.[28]

Short Form 12 – version 2 (SF-12v2)

The SF-12v2 Health Survey is a shorter version of the SF-36v2 Health Survey. It is a generic, HRQOL measure that assesses the functional health and well-being from patients' own perception. It consists of twelve questions, designated into eight domains from which the two composite scores of mental and physical health are derived. SF-12v2 was found to be a valid, sensitive and reliable substitute of the SF-36v2 for the Chinese in Hong Kong.[29]

Statistical Analysis

Descriptive statistics of the study population, including mean, standard deviation (SD) and percentage, were calculated. The construct validity of the BBQ and FABQ domains was assessed using Spearman's correlation test against the domain scores of SF-12v2 with similar constructs. The internal consistency reliability was assessed by Cronbach's alpha (α), whose value >0.7 represents adequate internal consistency. If the α for an instrument is below 0.6,

then its reliability may be questioned.[30] The sensitivity of the translated BBQ and FABQ was determined by known group comparisons using independent t-test and analysis of variance, where appropriate. Comparisons of known clinical groups were among patients who had a history of previous spine surgery, a history of trauma relating to the spine or accidental fall, diagnosis of spinal deformities (scoliosis, spondylolisthesis), disc degeneration, lumbar spondylosis/ degeneration with osteophytes, as well as examining patients with acute or chronic or acute on chronic LBP, and location of pain (back only versus back and leg pain with or without numbness).

Data analyses were conducted using SPSS Windows 23.0 (IBM SPSS Inc., Chicago, IL, USA) and STATA version 13.0 (StataCorp LP. College Station, Texas, U.S.). P-value <0.05 was statistically significant.

Results

After two patients were excluded due to their inability to understand Chinese in writing, a total of 100 patients (57% females) were recruited with mean age of 57.0±12.5 years. **Table 1** presents the demographics and clinical characteristics of patients. The descriptive statistics of BBQ and FABQ, ODI and SF-12v2 subscale and summary score are detailed in **Table 2**. For the translated BBQ, 82% of patients agreed or strongly agreed that the translated

questionnaire was clear and understandable, and none disagreed. (**Appendix 2**) For the translated FABQ, 73% of patients agreed or strongly agreed that the questionnaire was clear and understandable with 2% who disagreed. (**Appendix 3**)

Psychometric testing revealed that both BBQ and FABQ demonstrated an excellent overall internal consistency with $\alpha = 0.810$ and 0.859 respectively. (**Table 3**) For the FABQ with the two subscales, FABQ-W had a good internal consistency of 0.875 as compared to that of FABQ-PA ($\alpha = 0.606$). In addition, BBQ correlated significantly with both FABQ subscales ($p < 0.01$). The BBQ scores significantly correlated with ODI scores as well as *all* domains of SF-12v2 ($p<0.01$-0.05) whereas only FABQ-W correlated with ODI scores ($p<0.01$). FABQ-PA correlated significantly ($p<0.01$-0.05) with the domains of Bodily Pain, Social Functioning, Role Emotional, Mental Health and the Mental Composite Summary score of SF12v2, and the FABQ-W had significant correlations to domains of Physical Functioning, Role Physical, Bodily Pain, Social Functioning, Role Emotional, and the Physical Composite Summary score. Moreover, LBP VAS score significantly correlated ($p<0.01$-0.05) with BBQ score and FABQ-W. Both translated belief instruments, BBQ and the two subscales of FABQ correlated with each other ($p<0.01$).

For known-group validity, the translated questionnaires were tested for their sensitivity as per results in **Table 4**. BBQ was sensitive to patients with or without a history of trauma relating to spine/accidental fall. For FABQ, the FABQ-W subscale was sensitive to differences

between patients with acute versus chronic back pain, as well as in patients with or without a history of spinal tumour or infection. The FABQ-PA was not sensitive to any known groups.

Discussion

Psychosocial factors, which involve fear-avoidance beliefs and beliefs of back problem, are important risk factors of chronic LBP, which can interfere with work and HRQOL.[31] The role of psychosocial factors in the interplay between back pain, disability and physical activity should not be underestimated, particularly in terms of recovery and treatment outcomes. Fear avoidance beliefs can be modified to possibly improve treatment outcome,[21] and are associated with self-rated disability and work loss.[4, 32] It is thus desirable to establish reliable measures for assessing patients' beliefs towards LBP, in the aid of eliciting psychosocial data which can contribute to a more effective management of LBP and its related disability.

Both translated BBQ and FABQ demonstrated an excellent overall internal consistency, with a better internal consistency for the Work subscale than the Physical Activity subscale for FABQ. This is similar to the results of the original version, as well as those found in other validation studies of the translated FABQ.[3, 4, 13] The BBQ scores had significant though weak correlations with all domains of SF12v2 whereas both subscales of FABQ also had such correlations with the domains of Bodily Pain, Social Functioning and Role Emotional of

SF12v2. These suggest that both translated questionnaires contain pain and psychosocial components (in terms of emotion and social function as tested in the domains of the generic SF12v2). The fact that each of FABQ-PA and FABQ-W correlated to other various domains of SF12v2 suggested that each subscale is complementary of each other. In addition, correlation existed between BBQ and VAS-LBP score, indicating that the more severe the LBP, the more pessimistic the patients perceive about back pain. The negative, significant correlation of FABQ-W and VAS-LBP score suggests that the more severe the LBP patients experience, the greater their fear-avoidance beliefs.

Also, the translated BBQ and FABQ-W were found to be correlated with the LBP disability questionnaire ODI, demonstrating that the data captured by the translated questionnaires have a significant relationship with the ODI responses. This can be explained by the existing evidence that fear avoidance beliefs strongly influence the patient's perception of pain-related disability.[33] The correlation recognizes the relationship between disability and patient's back pain beliefs/beliefs of work activity being a cause of their LBP, and on their fear of perceived danger of work activity when they have an episode of LBP. Previous findings actually reveal individuals with long work absence due to LBP had more negative beliefs about work activities in relation to their back pain.[34]

The sensitivity of the translated FABQ, whose subscale FABQ-W, ascertains its ability in demonstrating significant difference between patients who experience acute versus chronic

pain, and those patients with/without spinal infection or tumour. In adjunct, BBQ is sensitive in differentiating among patients with or without a history of trauma to the spine/accidental fall. Those with such history had significantly lower BBQ scores and had more pessimistic beliefs about back pain. Importantly, negative pain beliefs can contribute to the transition from acute pain to persistent pain.[35] These negative beliefs can develop into fear-avoidance beliefs, including the fear of pain, injury or re-injury. These fear-avoidance beliefs can then result in a reduced level of physical activities and an increased level of disability.[36] Therefore such sensitivities of the instruments are desirable as the questionnaires have taken into account patients' previous back-related histories when assessing their current beliefs of back pain condition, These parameters could have already contributed significant differences in belief scores at baseline.

The translated back pain-specific instruments not only facilitate the collection of psychosocial data of LBP patients, they allow the identification of acute pain patients who are at risk of having pain persisting to a chronic nature, and can provide indications of those at risk of prolonged or delayed recovery. Previous studies found that fear-avoidance beliefs are associated with poor treatment outcome in patients with LBP of less than 6 months.[21] Thus for acute pain patients with high fear avoidance beliefs, the treatment approach can be multifaceted to incorporate psychological aspects, educational or fear-exposure measures. The timely administration of the multidisciplinary approach in the early stages of LBP can prevent

chronicity of pain and disability.[9] This is especially applicable to primary care settings.[37] This is rather crucial as for acute/subacute LBP patients, there is no clinically meaningful relationship between physical activity and disability.[38] On the contrary, high fear avoidance beliefs were found to be associated with more pain and or disability and less return to work; whereas reduction of pain-related fear concurred with decreased disability and elevated physical activities.[39] Therefore the indication of the level of fear avoidance beliefs and negative pain beliefs is also important in patients with recurrent episodes of LBP, or of chronic nature. Fear-avoidance beliefs appear to have predictive power in analyses of disability and work loss.[32]

The main limitation of this study is that the subject recruitment was at a single outpatient specialty clinic, as compared to a multi-center study. The data is also only representative of a single time-point, further study is required to examine the responsiveness of the translated questionnaires, such as testing the psychometric properties before and after interventions. The longitudinal comparison of patients' beliefs on back pain can then hopefully improve not only treatment outcome, but the efficacy and cost-effectiveness of clinical intervention. Also, it is important to emphasize that the sensitivity of score changes of BBQ and FABQ, especially to patients with a history of trauma or infection / tumour, should be interpreted with caution. The study has limited statistical power for comparing patients with history of trauma or

infection / tumour due to the relative small sample size in a specialist outpatient clinic and in the general population. Future study to reexamine these subgroups may be required.

Conclusion

The translated BBQ and FABQ (Traditional Chinese-Hong Kong) demonstrated satisfactory psychometric properties, with adequate internal consistencies, construct validity and sensitivities to the certain clinical parameters. This validation allows these measures to be used as a common tool for healthcare professionals to screen for patients who are at risk of developing chronic LBP from an acute condition, and those who may experience slower recovery rate, or prolonged rehabilitation. Further exploration of the translated BBQ and FABQ in relation to clinical interventions is required.

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