Translation, cross-cultural adaption and validation of the Chinese version of the educational needs assessment tool in knee osteoarthritis

Mwidimi Ndosi[1] and wl 1984[1]

[1]Affiliation not available

December 15, 2023

Cross-cultural validation of the educational needs assessment tool into Chinese for use in severe knee osteoarthritis

Abstract

Background: Patient education is an integral part of the management of osteoarthritis. The educational needs assessment tool (ENAT) was developed in the UK to help direct needs-based patient education in rheumatic diseases.

Aim: To adapt and validate the ENAT into Chinese, for use in severe knee osteoarthritis.

Methods: This cross-cultural validation study took two phases (i) Adaptation of the ENAT into Chinese (CENAT) (ii) Validation of the CENAT. The Construct validity was determined using factor analysis and criterion-related validity by comparing data from CENAT with data from different self-efficacy scales: patient-physician interactions scale (PEPPI-10), self-efficacy for rehabilitation outcome scale (SER) and the self-efficacy for exercise scale (SEE).

Results: The sample comprised 196 patients, with mean age 63.61±8.7, disease duration 11.48±6.6 and 57.1% were female. The CENAT was found to have high internal consistency. The CENAT had significant correlations with the Chinese versions of PEPPI r=0.398, SER r=0.397 and SEE r=0.387. There were no significant correlations with age r=-0.029 or disease duration r=-0.113.

Conclusion: The ENAT translated well into Chinese and has adequate validity in knee osteoarthritis. Future studies will further inform

its usefulness in clinics, community and online settings

Keywords: Assessment; Educational Needs; Keen Osteoarthritis; Instrument Validation

1. Introduction

Knee osteoarthritis (KOA) is a common disease of the knee joint, which leads to long-term joint pain, limited movement and poor quality of life in the affected patients [1]. In the United States, more than 27 million adults suffer from knee osteoarthritis [2]. It is estimated that 10% of people older than 55 years have

disabling knee symptoms due to knee osteoarthritis in United Kingdom [3]. In China, the incidence of knee osteoarthritis is 13.2% in 40~70 years age group [4].

Patients' education is an important aspect of the management of osteoarthritis. The management guidelines for patients with osteoarthritis point out that "patients should receive patient education on their first consultation with health providers" [5-6]. The purpose of patient education is to help patients manage their diseases and improve their life quality [6-7]. However, research finding shave shown that routine patient education struggle to achieve long-term impact on patients [8], therefore, individualized, needs-based educational programs which put the patient at the centre are advocated [9]. Understanding the patients' needs for education is a prerequisite in the development of an effective patient-centered education and some studies have proposed the development of individualized self-management programs for people with osteoarthritis to improve their health status [10, 11].The European League Against Rheumatism has developed evidence-based recommendations which provide guidance on the delivery of non-pharmacological interventions of people with hip or KOA [12]. These include individualised treatment and patient education regarding lifestyle changes, exercise and other aspects of disease management.

Research on patients' educational needs in patients with arthritis is lacking in China. In the UK, the educational needs assessment tool (ENAT) was developed over 10 years ago [13] and has been validated in various disease groups [14]. The ENAT has been shown to help nurses direct[MN1] needs-based patient education for people with RA [15]. The ENAT is a simple 39-item questionnaire used to assess educational needs of people with arthritis. It consists of seven domains: pain management (6 items), activity (5 items), feeling (4 items), arthritis course (7 items), treatment (7 items), self-care measure (6 items) and support system (4 items). Each item has a 5-point Likert scale, scored as: 0 = not important, 1 = a little important, 2 = fairly important, 3 = very important and 4 = extremely important; thus directly reflecting the patients' educational needs[13]. In the Netherlands, the Dutch version ENAT has been used determine educational needs of patients with RA, SLE and SSc [16-18]. In Poland, the Polish version of the tool was validated and used to summarise the educational needs of patients with RA and SSc[19-21].

Nurses spend a lot of time in patient education and providing needs-based patient education ensures that this important activity is effective[6]. The ENAT is the tool with which this can be achieved. In China, research on educational needs of patients with arthritis is at an infancy stage and no tools are available for assessment of patients' educational needs. The aim of this study was to adapt the ENAT into Chinese (CENAT) and validate it for use in knee osteoarthritis.

[MN1]This is correct don't use an apostrophe here it will change the meaning

2. Methods

2.1. Study design. Patients and ethical approval

This was a cross-sectional study which involved two phases: (i) adaptation of the original (English) ENAT into Chinese by researchers from two hospitals in Beijing and Tianjin, between January and February 2016 (ii) testing the validity of the CENAT in patients with knee osteoarthritis.

In phase 2, we included patients who were hospitalized for knee osteoarthritis of Kellgren–Lawrence grade IV by X-ray[21] and had the ability to complete the questionnaire independently. We excluded participants who were not able to complete the questionnaire, such as those who were unconscious, with severe mental disorders, cognitive dysfunction or other serious illnesses. All participants signed an informed consent and the study received favorable ethical approval by the hospital ethics committee.

2.1.2. The adaptation of the ENAT into Chinese

The ENAT was translated into Chinese according to an established cross-cultural adaptation methodology described by Beaton et al[21], which consists of 5 stages: initial translation, synthesis of these translations, back translation, expert committee assessment and field-testing. [A1] First, the ENAT was first translated into Chinese by two senior translators, one is a professional bilingual translator and the other is a bilingual translator with medical educational background. Each translator worked out a report (T1 and T2). Second, two translators with medical educational background joined the team to discuss T1 and T2, and then they revised, edited and summarized the third translation report (T3). Third, translation report (T3) was back-translated by two translators who lived and studied in America for a long time generating two back-translated versions respectively (BT1 and BT2). Fourth, all translators discussed and reached a consensus on all translated items. Following this meeting, five patients with severe knee osteoarthritis were recruited to help in a preliminary test to determine the readability and feasibility of the CENAT. The patients evaluated the specific contents of the scale and in discussion with the staff, they produced a draft CENAT ready for psychometric testing. See Appendix A.

2.1.3 Validation of the CENAT

Following the cross-cultural adaptation, the CENAT was given to patients with KOA and the data was used to test for different types of validity: (i) construct validity using factor analysis (ii) internal consistency and (iii) concurrent validity, assessed by comparing the CENAT data with self-efficacy data (the self-efficacy for exercise, the self-efficacy for rehabilitation and perceived efficacy in patient-physician interactions).

While the CENAT data was used for testing its construct validity (using factor analysis) and internal consistency, the concurrent validity testing involved data from other questionnaires, namely: the self-efficacy for exercise scale (SEE), the self-efficacy for rehabilitation outcome scale (SER) and the perceived efficacy in patient-physician interactions scale (PEPPI-10). Patients who consented were given the CENAT and the other questionnaires to complete independently and return to the investigators.

The self-efficacy for exercise scale (SEE) is used to measure self-efficacy for exercise[22]. The English version has a high internal consistency (Cronbach's α coefficient = 0.92). The Chinese version SEE is validated and used in clinical studies[23]. The Cronbach's α coefficient of the Chinese version SEE is 0.75. The self-efficacy for rehabilitation outcome scale (SER) is validated for measuring the patients' confidence in functional exercise after hip and knee replacement surgery[24]. The Chinese version SER is validated and used in clinical research[25]. The tool consists of 12 items and the Cronbach's α coefficient of the Chinese version SER is 0.942. The 10-item perceived efficacy in patient-physician interactions scale (PEPPI-10) is used to test the confidence level in patient-physician interactions [26]. The Chinese version PEPPI-10 was validated and has been shown to have Cronbach's α coefficient of 0.907[27]. The ENAT has been validated in

seven rheumatic diseases including osteoarthritis [28] and this study validated its Chinese version (CENAT).

Once returned, the data from the questionnaires were anonymised and entered into a spreadsheet for data cleaning and analysis. The statistical tests are detailed in the next section.

2.2. Statistical analysis

In this study, factor analysis was used to validate the Chinese version of ENAT, that is, to find representative factors of the scale[29]. Principal component analysis and maximum variance method were adopted in this study to extract the main factors which met the requirements (Eigen value component matrix was rotated by maximum variance method, and the rotated matrix variable score was >0.60, which was within the factor's range). Cronbach's α coefficient was used to evaluate the internal consistency of the Chinese ENAT. Cronbach's α coefficient of more than 0.7 indicates that the measured scale has good internal consistency [30].

The correlations between the CENAT and SER, SEE, and PEPPI were also measured to assess the criterion-related validity of the CENAT. If the data had normal distributed, the correlations of the three variables were determined by Pearson correlation coefficient; otherwise, the Spearman correlation coefficient was used with values of .20-.39, .40-.59, .60-.79 and .80 -1.0 representing weak, moderate, strong and very strong correlations respectively[31]. In rheumatoid arthritis population, needs-based patient education had an effect on self-efficacy[14], therefore, it is plausible to expect that the educational needs would be highly correlated with self-efficacy (convergent validity) and not correlated to age or disease duration (divergent validity).

Statistical analyses were performed using SPSS 19.0, IBM Corporation, Armonk, NY, USA; 2010. Structural validity was assessed using confirmatory factor analysis with LISREL 8.7, Scientific Software International, Lincolnwood, IL, USA.

[A1]This section is important. There are many other adaptation methodologies out there and it is important to mention that we followed the Beaton's method.

3. Results

3.1. Patient characteristics

Overall, 200 participants were recruited and 4 were excluded from the analysis due to missing responses to items in the CENAT. The evaluable population comprised 196 patients with mean age 63.61±8.7, mean disease duration 11.48±6.6 and 57.1% were women. Other patient characteristics are summarized in table 1.

3.2. Results of the adaptation phase

During the adaptation process of the ENAT, the researchers encountered unclear concepts, grammar and idioms that were influenced by an English cultural background. Through discussion, the translators, the clinical staff and the members of the expert committee reached a consensus on the most appropriate terminology to help Chinese participants understand the items. Table 2 presents the results of the back-translation, issues

and agreements for each ENAT item. These results demonstrate that different cultural backgrounds, national conditions and social systems were taken into account in the adaptation to enable patients' understanding of the items. (Figure 1)

3.3. Internal consistency

The study results showed that the Cronbach's α coefficient of the CENAT was 0.740. Bartlett spherical test performed on the CENAT data revealed $\chi2 = 6458.531$ ($P<0.01$), which is acceptable for factor analysis. Kaiser—Meyer—Olkin measure was 0.956. Common factors with the characteristic value [?]1 were extracted by using principal component analysis and maximum variance rotation method. The results showed that the characteristic value of factor 1, factor 2, factor 3, factor 4, and factor 5 were [?]1, and the contribution rate was 67.9%, including all 39 items(Table 2). The confirmatory factor analysis showed good fit indices for a five-factor model of the CENAT ($df=692$, P-value =0.000, root mean square error of approximation = 0.083). The correlation coefficient between the five factors ranged betwee 0.66 to 0.91 See Figures 2.

3.4 Criterion related validity

Table 3 presents the Spearman correlations between the CENAT and other measures. The results showed that the CENAT had significant correlations with PEPPI r=0.398, p<0.001; SER r=0.397, p<0.001; and SEE r=0.387; p<0.001). There were no significant correlations with age r=-0.029, p=0.690 or disease duration r=-0.113, p=0.114

4. Discussion

In the present study, a standard adaptation methodxx[A1] was used to adapt the ENAT into Chinese and this process was useful in ensuring the conceptual equivalence between the original (English) ENAT and the Chinese version. Simplistic translation of a questionnaire into another language without cross-cultural adaptation and validation is inadequate [21,32]. Due to different cultural background, national conditions and other factors, some items of the Chinese ENAT could not be directly translated into Chinese therefore the adaptation process took account of culture to ensure the concepts contained in the items were meaningful to Chinese patients.

Since our purpose was to adapt the ENAT into Chinese and test its validity, the results have confirmed that our purpose has been achieved and the CENAT is a valid tool for assessing the educational needs of patients with severe knee osteoarthritis in China. Factor analysis and results of the internal consistency have demonstrated that the ENAT has retained its construct validity after been adapted into Chinese. . In chronic disease, self-efficacy has been shown to mediate the effect of patient education[15]. The significant correlation between the CENAT and measures of self-efficacy implies a convergent validity,. Conversely, the lack of significant correlation with age and disease duration implies a divergent validity, both of which provide further evidence of the validity of the CENAT in KOA.

The ENAT was designed to assess educational needs of patients with arthritis and in this study, we have demonstrated its validity in Chinese population of patients with knee OA. The CENAT can therefore be used to direct needs-based education and to develop the health educational programs in patients with KOA in China.

The limitations of this study are that (i) we could not undertake more powerful analyses such as item-

5

response theory or exploration of differential item-functioning. While those analyses can be carried out in the future, we believe that the current analysis provides sufficient evidence of validity of the CENAT (ii) being a cross-sectional study, sensitivity to change was not assessed (iii) the CENAT was used in hard copy (paper) form and as the technology of questionnaire moved into electronic forms, its response in online and app forms may need to be assessed (iv) this study validates the CENAT in KOA, therefore further evidence will be required before the tool is used in other types of osteoarthritis. Despite the above limitations, we believe our conclusions are well supportive of the validity of the CENAT in this patient population.

5. Conclusion

This is the first study to adapt and validate the ENAT into Chinese for use in severe KOA. We systematically investigated the validity of the Chinese version ENAT, showing that the Chinese version ENAT has a good construct validity, internal consistency and criterion-related validity. Therefore, this tool can help nurses to assess the educational needs of patients with severe KOA and provide effective needs-based patient education. Although the scale has demonstrated validity and internal consistency in this study, the sensitivity to change will need further research.

Declaration of interest

This researcher did not receive any financial support and all authors declare that they have no conflict of interest.

[A1]Insert a citation for Beaton et al (2000) here

Beaton, D. E., Bombardier, C., Guillemin, F., & Ferraz, M. B.Guidelines for the process of cross-cultural adaptation of self-report measures. Spine.(Phila Pa 1976),2000;25(24):3186-3191

7