



RESEARCH ARTICLE

VALIDITY AND RELIABILITY OF THE ARABIC VERSION OF THE FREMANTLE BACK AWARENESS QUESTIONNAIRE

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ABSTRACT

Objective: To translate, culturally adapt, validate, and investigate the reliability of Arabic version of Fremantle Back Awareness Questionnaire (FreBAQ-A) for patients with non-specific chronic low back pain (CLBP). **Method:** Thirty experts (three panels) and 270 non-specific CLBP patients (41.72±7.765years) were recruited for psychometric evaluation. Test-retest as well as internal consistency analyses were used to assess reliability. Intraclass correlation coefficient (95% confidence interval) was used to assess test-retest analysis, whereas Cronbach alpha value was calculated to assess the internal consistency. FreBAQ-A validity was evaluated in forms of face, content, internal, and external construct validity. Demographic parameters, clinical characteristics like pain using numerical rating scale (NRS), Oswestry Disability Index (ODI), and Tampa scale of kinesiophobia (TSK) were assessed along with responses to the study questionnaire. **Results:** Factor analysis revealed that the Arabic version of FreBAQ has two factorial structures and The FreBAQ-A correlated well with intensity of pain ($r = -0.426$), duration of the LBP ($r = 0.526$), disability score ($r = 0.381$), but no significant relation with TSK score ($r = 0.257$). The Cronbach alpha in this study for FreBAQ-A was 0.737 Cronbach's Alpha for which is above 0.7, indicating that the scale Can be considered internally consistent within our sample, and below 0.9 suggesting that None of the items are redundant. It has high test-retest, the ICC value of the total questionnaire score Of FreBAQ-A was 0.96, ($P < 0.0001$) suggesting that test-retest findings are strongly correlated. **Conclusion:** The Arabic version of FreBAQ has acceptable psychometric properties of reliability and validity in the evaluation of back altered perception in Arabic-speaking people with non-specific CLBP and can be useful for use in future research and clinical trials.

INTRODUCTION

Most people experience low back pain (LBP) at some point in their lifetime. The alteration of awareness and perception of the affected bodily part is linked to pain. This can involve changes in the perceived size/shape, location, mobility, or ownership of a body part, resulting in a body perception that differs significantly from reality. The chronic LBP experience may be aggravated by distorted body perception. In brain areas assumed to serve body perception, researchers have regularly documented cortical reorganisation, morphological modifications, and biochemical changes (1). Evidence shows a special relation between the brain mechanisms and pain Perception which makes People with Chronic low back pain (CLBP) Display structural and functional changes in the brain, such as degeneration, reorganization and altered neurochemistry. In key cortical areas (2). The Fremantle Back Awareness Questionnaire (FreBAQ) is the only self-report

questionnaire currently available for examining back-specific body awareness in people with non-specific CLBP (3). It was recently designed as a quick and easy way to examine patients with CLBP's altered perceptual awareness of the back which the participant scores the degree of agreement for nine items (e.g., "My back feels as though it's not part of the rest of my body.") on a scale of 0 (never) to 4 (always) Item 1-3 assesses neglect-like symptoms, item 4-5 assesses decreased proprioceptive acuity, and item 6 assesses perceived trunk shape and size (item 6-9) (1). Creation of questionnaires in different languages must pass through many steps. Questionnaires must be translated, then culturally adapted to the environment in which they will be used. In addition, evaluation of questionnaire psychometric properties should be done to ensure that this tool has the original version characteristics, validity, and reliability (4). A valid tool must have good face, content, criterion, and construct validity, all of which must be connected and the degree to which test responders regard the content of a test and its items as relevant to the circumstances in which the test is delivered is known as face validity (5).

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The original version of FreBAQ was created in English (3); however, many languages such as Dutch, Chinese, Japanese, Germany, Turkish, Persian, and Indian translations have been developed and culturally adapted (1,2,6,7,8,9,10). However, this questionnaire had not been translated into the Arabic language, so it had a limited use in Egypt as well as Arabic countries. Therefore, the aim of this study was to translate, culturally adapt, validate, and test the reliability of the FreBAQ Arabic version to be used with chronic low back pain patients in Arabic countries.

METHODS

The present study was conducted in the outpatient clinic of Al Kasr Al-Ainy Hospital, Cairo University to translate, culturally adapt, validate, and test the reliability of the FreBAQ Arabic version to evaluate the back pain and disability level in non-specific CLBP patients. The study was approved by the faculty of physical therapy ethical committee review board (No: P.T.REC/012/002942), and each patient signed a consent form that clearly described the experimental protocol.

Study design: The study design was a cross-cultural validation of the FreBAQ Arabic version for patients with non-specific CLBP.

Participant: Three expert panels (10 experts each) were involved in this study to test the face and content validity of FreBAQ Arabic version. All experts had experience not less than 10 years and all of them are PhD holders in physical therapy; the major part of their work is with Arabic population; also, they were fluent in Arabic and English. Thirty patients per item were chosen to estimate the sample size for testing the psychometric properties of the FreBAQ Arabic version (12). So, 270 patients (149 male patients and 121 female patients), were chosen according to the following criteria: Their age ranged between 30–59 years (41.72 ± 7.765), with non-specific CLBP (for the previous 3 months) referred by physician, conscious and ambulant, able to read and write in Arabic. Patients suffered from neurological diseases, congenital deformities, fixed spinal deformity, rheumatoid arthritis, bone disease, or infection, such as bone cancer and tuberculosis, and patients suffering from back pain due to trauma were excluded from the study. Each participant signed the consent form before participation according to the principles of the Declaration of Helsinki of 1975.

MATERIALS AND PROCEDURES

Translation and cultural adaptation: The FreBAQ translation and cross-cultural adaptation into Arabic version were done according to the most recent and comprehensive guidelines of Borsa et al (11) and Sousa and Rojjanasirat (12). FreBAQ is a 9-item scale used to assess back-specific body awareness in people with non-specific CLBP (3).

Forward translation: Arabic language translation of FreBAQ English scale was done by two independent native Arabic language translators and resulted into two forward-translated versions of the scale (A1 and A2). One translator was knowledgeable about health terminology and the content area of the construct of the tool in the Arabic, and the other translator was knowledgeable about the cultural and linguistic nuances of the Arabic language.

Synthesis of Versions A1 and A2 into A1, 2: A1 and A2 versions were compared and merged by the researchers and research committee of basic science for physical therapy. Some of the faculty members at the faculty of physical therapy were asked for help in resolving ambiguities and discrepancies. This stage led to the development of the preliminary initial translated Arabic version (A1, 2).

Blind back translation: The preliminary initial translated Arabic version (A1, 2) of the scale was translated into English to produce two back-translated versions (B1 and B2). Two translators independently participated in the back translation, and they were blinded to the original English version of the FreBAQ during this process. The two translators had distinct backgrounds; one translator was knowledgeable about health terminology and the content area of the construct of the tool in the English, and the other translator was knowledgeable about the cultural and linguistic nuances of the English.

Expert committee: The committee consisted of researchers, health professionals, translators, and a language professional. The committee compared back translation of the scale B1 with B2, and also compared both B1 and B2 with the original English scale regarding instructions, items, response format, wording, sentence structure, meaning, and relevance. The committee reviewed all the translations (A1 and A2, A1, 2, B1 and B2) and the written report comparing the back translations with the forward-translation A1,2. Based on those translations, the preliminary initial translated Arabic version was considered to be the prefinal Arabic version of the scale.

Face and content validity: Three expert panels tested the prefinal Arabic version of the scale for face and content validity. The first expert panel (10 experts) were asked to evaluate each item of the tool for clarity (face validity) and provide suggestions to improve its clarity; dichotomous questions (clear/unclear) is used. According to the suggestions of the first expert panel, slight changes had been made to improve the clarity index to the minimum acceptable value (80%; Borsa et al., 2012) so that it can be given to the patients. Then the second expert panel reassessed the clarity of modified prefinal Arabic version of the scale. Then the third expert panel (10 experts) was asked to evaluate each item of the modified prefinal Arabic version of the scale for content equivalence (content-related validity) using the following scale: 1 = not relevant; 2 = unable to assess relevance; 3 = relevant but needs minor alteration; 4 = very relevant and succinct and give suggestions to improve its relevance (1 and 2 considered not relevant, 3 and 4 considered relevant). After the modified prefinal version passed expert face and content validity tests, it was named the final version.

Full psychometric testing: To establish the initial full psychometric properties of the newly translated, adapted, and cross-validated Arabic version of FreBAQ, 270 patients of non-specific CLBP participated in this study. The demographic profile of patients is shown in (Table 1). Patients filled out the Arabic version of FreBAQ along with The Arabic version of Numerical Rating Scale (NRS) (13), the Arabic version of Oswestry Disability Index (ODI) (14) and The Arabic version of Tampa Scale for Kinesiophobia (TSK) (15), and the patients then completed the FreBAQ-A 1 week later.

Table 1. Demographic Data and clinical status of the study participants of Participants

Characteristics	Value
Age(years), mean (SD), Range	41.72(7.765), 30-59
Weight(kg), mean (SD), Range	81.578(7.709), 55-99
Height(cm), mean (SD), Range	168.196(7.701), 150-183
BMI (kg/m ²), mean (SD), Range	28.92(3.075), 20.538-3
Gender (n (%))	
Male	121(44.81%)
Female	149(55.18%)
Average duration of back pain (years), mean (SD)	2.82(1.399), 1year-6 years
Average pain score, mean \pm SD	6.12 \pm 1.44
Disability (ODI) score, mean \pm SD	26.15 \pm 8.96
TSK score, mean \pm SD	31.02 \pm 6.82

Statistical analysis: Statistical analysis was performed using SPSS for windows, version 26 (SPSS, Inc., Chicago, IL) for data analysis. Continuous variables are shown by mean and standard deviation, and the categories are demonstrated in frequency and percentage. Test-retest and internal consistency analyses were performed to determine the reliability of the Arabic version of the FreBAQ. The internal consistency measures the degree to which items making up the total score are all measuring the same underlying construct. The internal consistency was assessed using Cronbach alpha, and the value was considered poor if Cronbach's alpha below 0.70, between 0.70 and 0.80 was good internal consistency, and above 0.80 was excellent internal consistency (16). Test-retest reliability of the Arabic version of back FreBAQ was evaluated using the two-way mixed intraclass correlation coefficient (ICC) with 95% confidence interval (95% CI) values of ≥ 0.8 that were considered as a high level of correlation (17). Face validity and content validity were assessed descriptively. The content validity was measured by item content validity index (I-CVI) and scale content validity indices (S-CVI/ Ave and S-CVI/UA). Construct validity was assessed by factor analysis and external construct validity. External construct validity, the degree of agreement between the FreBAQ and NRS, duration of chronic low back pain, ODI, and TSK scales, was estimated using Pearson correlation coefficients comparing for answers given at baseline and 1 week later. For the Pearson correlation coefficient are the following: excellent, 0.81 to 1.00; very good, 0.61 to 0.80; good, 0.41 to 0.60; poor, 0.21 to 0.40; and no correlation, 0 to 0.20 (18). To determine the adequacy and the suitability of the sample, Kaiser-Meyer-Olkin and Bartlett's tests were used before factor analysis.

RESULTS

Validity of Arabic version of FreBAQ

Face validity analysis: Two expert panels participated to test the face validity of Arabic-language version of FreBAQ. The first expert panel consisted of ten experts with mean experience (21.3 \pm 3.36) years, all of them are PhD holders. The second expert panel consisted of ten experts with mean experience (21.2 \pm 9.08) years, all of them are PhD holders. According to 1st expert panel opinion, the clarity index for all nine items was 83%, where clarity index was 80% for 6 items, 90% for 3 items. The modifications from the first experts' panel were applied to the Arabic version of FreBAQ and sent to the second expert committee (2nd panel). According to 2nd expert panel opinion, the clarity index for all nine items was 96%, where clarity index was 90% for 4 items, 100% for 5

items. This version then became the final Arabic version of the FreBAQ for validation testing.

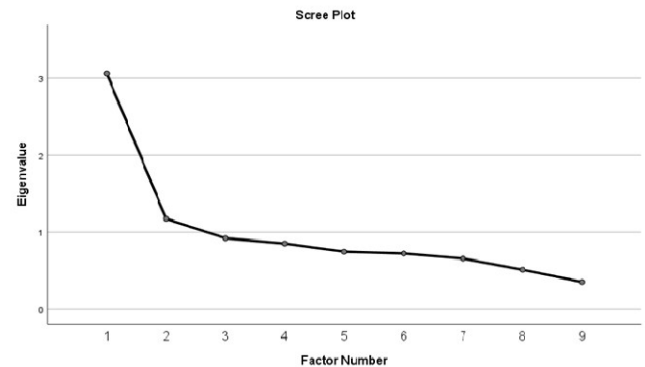
Content validity analysis: According to the experts' opinions (third expert panel), I-ICV were 100% for all items except Item 5,6 (90%). Also, the mean scale CVI (SCVI/Ave) of all items was 97.77%, the scale validity index universal agreement (S-CVI/UA) was 77.77%, and the mean expert proportion was 97.8%. So, the content validity of the Arabic version of FreBAQ was excellent according to experts' opinions.

Table 2. KMO and Bartlett's test for Dimension reduction

FreBAQ-A	Bartlett's Test	KMO Test	P value
	452.969	0.790	0.0001

Table 3. Correlation between total FreBAQ-A score and clinical variables

Clinical variables	FreBAQ-A total score
NRS score	-0.426
ODI score	0.381
TSK score	0.257
Duration of CLBP	0.526

**Fig. 1. Screen plot graph of the Arabic version of the FreBAQ**

Construct validity: The sample size was suitable and adequate for factor analysis according to Kaiser-Meyer-Olkin and Bartlett tests (Table 2). The questionnaire was found to have a Two factorial structure by scree plot graph (Figure 1) shows that the optimal number of factors to be used is two factors. And this means that all the questionnaire questions refer to two aspects. All questions correlate well with one factor except for the fourth question. the second factor only correlates with the fourth question. External construct validity between total score of FreBAQ-A and other clinical variables shows that The FreBAQ-A correlated significantly with pain score (NRS) ($r = -0.426$), duration of CLBP ($r = 0.526$), disability score (ODI) ($r = 0.381$), but no significant correlation with TSK score ($r = 0.257$) (Table 3).

Reliability of Arabic version of FreBAQ

Internal consistency: The internal consistency for the Arabic version of the FreBAQ questionnaire was measured by Cronbach alpha. The Cronbach alpha was 0.737 indicating that the questionnaire has a high internal consistency. All values of Cronbach alpha decreased when each item/ question was excluded as shown in (Table 4), which indicates that all of the nine scales items/questions contribute to the overall score of the questionnaire.

Table 4. Internal consistency of Arabic version of Fremantle Back Awareness Questionnaire

Item	Q 1	Q 2	Q 3	Q 4	Q 5	Q 6	Q 7	Q 8	Q 9	Total score
Cronbach's α if item is deleted	0.717	0.719	0.715	0.732	0.72	0.717	0.707	0.711	0.688	0.737

Test-retest reliability: To test the reliability of the Arabic version of FreBAQ, patients were asked to refill the questionnaire another time after 7 days (second measurement). The ICC values (95% CI) of each question varied between 0.92 and 0.97 ($p < .0001$). The ICC value of the total score of the questionnaire was 0.96 (95%CI: 0.975-0.984) ($p < .0001$) indicating that the Arabic version of FreBAQ has high test-retest results (Table 5).

Table 5. Correlation coefficients of responses between the first and second time

Variable	Correlation coefficient	95% IC	P- value
Question 1	0.926	(0.951-0.97)	< 0.0001
Question 2	0.918	(0.946-0.966)	< 0.0001
Question 3	0.907	(0.938-0.962)	< 0.0001
Question 4	0.894	(0.929-0.956)	< 0.0001
Question 5	0.898	(0.931-0.958)	< 0.0001
Question 6	0.904	(0.936-0.96)	< 0.0001
Question 7	0.921	(0.948-0.968)	< 0.0001
Question 8	0.914	(0.944-0.965)	< 0.0001
Question 9	0.893	(0.944-0.965)	< 0.0001
Total Score	0.963	(0.975-0.984)	< 0.0001

Floor and ceiling effect: The response distributions for each item showed that all response categories were used for all items with no significant floor or ceiling effects. According to Dean et al., 2018 (19), a total of <40% respondents selecting "0" or "10" indicated that an item does not show significant "floor" or "ceiling" effects, respectively and it was hence reassuring that the vast majority of items in the FreBAQ had floor effects 1.5% and ceiling effects 0.4% as shown in (Table 6).

Table 6. Ceiling and floor effects of the total score of FreBAQ

Responses to FreBAQ	Count	Percentage
2	4	1.5% (Floor Effect)
24	1	0.4% (Ceiling effect)

DISCUSSION

The aim of the current study was to translate, culturally adapt, validate, and test the reliability of the Arabic version of FreBAQ. Although the translation and cultural adaptation of the Arabic version of the FreBAQ for patients with chronic low back pain was a long and tedious multistep process, it was successfully established according to the most recent, comprehensive, and published guidelines Sousa & Rojjanasrirat and Borsa et al (11, 12). The FreBAQ-A might be considered a valid and reliable tool for the Arabic speaking population. The face validity of Arabic-language version of FreBAQ questionnaire was excellent as tested by two expert panels. According to the first experts' panel, the clarity index of all the nine items was 83%, and their modifications were applied to the Arabic version of FreBAQ and sent to the second experts' panel. The prefinal form was modified to include the changes with consensus by the second panel, so the clarity of the Arabic version of FreBAQ was 96%. Although other studies didn't test the face validity of the questionnaire, we decided to test the face validity as it involves the expert looking at the items in the questionnaire and agreeing that the test is a valid measure of the concept which is being measured just on the face of it.

This means that they are evaluating whether each of the measuring items matches any given conceptual domain of the concept (20). The Content validity examines the extent to which the concepts of interest are comprehensively represented by the items in the questionnaire (21). This study attempted to assess the content validity of the Arabic version of the FreBAQ, although this was done for the English version when it was originally created current methodology states that the content should also be evaluated when translating into a new language (22). The I-ICV were 100% for all items except Item 5,6 (90%). Also, the mean scale CVI (SCVI/Ave) of all items was 97.77%, the scale validity index universal agreement (S-CVI/UA) was 77.77%, and the mean expert proportion was 97.8%, so the content validity of the Arabic version of FreBAQ was excellent according to experts' opinions. The structural validity of Arabic FreBAQ was measured by factor analysis and the sample size was suitable and adequate for factor analysis according to Kaiser-Meyer-Olkin test results which attempts to identify the underlying variables or factors in order to explain the pattern of correlation between the observed variables.

The result of factor analysis showed that all items loaded on the two factors confirmed the structural validity of Arabic FreBAQ which came along with principal component analysis of the Dutch and Japanese versions had shown a second dimension (1,6), despite that the original version of FreBAQ was designed as a unidimensional scale to evaluate a single concept (3). Nevertheless, the original version reported a possible second dimension consisting of the items 4, 5, and 6 (3). The construct validity was obtained by determining the relationship between the score of FreBAQ-A and the scores of NRS, ODI, TSK and duration of pain (13,14,15). In this study, it is found that there is a positive association between Arabic FreBAQ with disability which is came along with English, Japanese, German, Turkish and Chinese (3,6,7,8,9,2). This could be explained by the fact that an inability to adequately perform activities of daily living might be associated with reduced sensorimotor lumbopelvic control (23) and also Conditions such as the size, location, asymmetric perception of the back, or deterioration in the planning and control of the movement may lead to the belief that the back is functionally problematic. Surprisingly, Indian version did not observe any significant relation with a disability, probably reflecting altered body perception is not simply a function of disability. The major reason leading to disability seen in patients with chronic low backache without any red flags is the pain itself. This might explain the lack of relationship between questionnaire scores and disability (10). Unlike the Japanese version, this current study showed a direct relation of the questionnaire results with a duration of the CLBP (6). In all probabilities, this is implicating as the duration of the pain increases, chances of altered back perception are higher. In addition, there is a negative association with the intensity of pain which came along agreement with the Indian FreBAQ and this probably reflects a participant who is in severe pain is unable to concentrate on the altered perception; rather, he/she appreciates the alteration only when pain reduces and It is only when pain is reduced other issues are unmasked (10). Dutch and Persian version of the FreBAQ showed no significant

correlation between the pain score and disturbed body perception (1,9) while the original and other translated versions demonstrated significant relationships (3,6,7,8). The original version measured average pain intensity over the past week (24). The Japanese and Turkish versions assessed pain in rest and motion (6,8) In addition, LBP severity and interference was measured by the German version (7), The present study evaluated current pain intensity of the LBP patients shows a negative association with the intensity of pain. The differences observed might be due to the methodology used for assessing pain in various studies. Moreover, the disturbed body perception in the studied LBP sample was not associated with changes in kinesiophobia (TSK) which is in agreement with the Dutch, English, and Persian FreBAQ who also did not find an association between FreBAQ score and TSK scores (1,3,9). The further evaluation of original FreBAQ evaluated pain related fear using the Fear Avoidance Beliefs Questionnaire and reported a significant correlation between back self-perception and fear avoidance beliefs (24). The Turkish version showed significant relationship with TSK score (8). These differences observed may have been due to the sample size in the methodology. There is a need for further studies with larger patient groups to investigate the relationship between kinesiophobia and back awareness.

Similar to the original English version of FreBAQ, the internal consistency for Arabic FreBAQ was acceptable. The Cronbach's alpha of 0.737 was found to be quite high similar to the other languages' versions such as Dutch, Germany, Turkish and Persian (1,3,7,8,9). Internal consistency reliability was used to assess the interrelationship among the questionnaire items. High Cronbach's alpha indicates the homogeneity of Arabic FreBAQ items measuring the same construct. The result of Cronbach's alpha if an item was deleted is useful for determining which item from among a set of items contributes to the total alpha. The internal consistency of the questionnaire was not significantly affected by deletion of any item. Test-retest reliability refers to the consistency of measurements when administered twice with an interval between test administrations. In the current study, the interval between two times of evaluation was 1 week, and the ICC coefficient was calculated for test-retest reliability. The values of ICC value of the total score of the questionnaire indicate that the Arabic version of the FreBAQ-A has high test-retest, the ICC value of the total questionnaire score Of FreBAQ-A was 0.96 (95%CI:0.975-0.984). Test-retest results of the current study were in line with the ICC value of the Persian version of FreBAQ (9) and higher than the other studies such as Dutch, Chinese English, Japanese, and Germany versions (1,2,3,6,7) Considering the ICC values of each question and the total score of the questionnaire, it was possible to say that the Arabic version of the FreBAQ is stable over time. Ceiling effect is considered to be present if the percentage of patients with the highest score is more than 15%, Floor effect is considered to be present if more than 15% of the patients achieve the lowest possible score as stated by (25). The presence of significant floor or ceiling effects implies the lack of content validity. In our study the floor effect was 1.5% and the ceiling effect was 0.4 % so the response distributions for each item showed that all none of the patients' scores were at the maximal or minimal value, indicating no floor or ceiling effect. The lack of floor and ceiling effects found for FreBAQ-A was comparable to Dutch, Japanese, German, Turkish and Persian FreBAQ versions had not reported the floor and ceiling effects (1,6,7,8,9).

CONCLUSION

The Arabic version of FreBAQ is valid and reliable. Factor analysis demonstrated that it has Two factors, and the external construct validity of FreBAQ has very high levels of correlation with NRS, ODI and duration of chronic low back pain. In addition, the FreBAQ has high test-retest and good internal consistency reliability.

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CONFLICT OF INTEREST

The authors do not report any conflicts in the work.

REFERENCES

- Janssens, L., Goossens, N., Wand, B. M., Pijnenburg, M., Thys, T., & Brumagne, S. (2017). The development of the Dutch version of the Fremantle Back Awareness Questionnaire. *Musculoskeletal Science and Practice*, 32, 84-91.
- Hu, F., Liu, C., Cao, S., Wang, X., Liu, W., Li, T., ... & Zhang, X. (2022). Cross-cultural adaptation and validation of the simplified chinese version of the fremantle back awareness questionnaire in patients with low back Pain. *European Spine Journal*, 31(4), 935-942.
- Wand, B. M., James, M., Abbaszadeh, S., George, P. J., Formby, P. M., Smith, A. J., & O'Connell, N. E. (2014). Assessing self-perception in patients with chronic low back pain: development of a back-specific body-perception questionnaire. *Journal of back and musculoskeletal rehabilitation*, 27(4), 463-473.
- Elerian, A. E., Abdel-Aal, N. M., & Abdelhay, M. I. (2020). Bournemouth questionnaire Arabic version: Cross-cultural adaptation, validity, and reliability for patients with low back pain. *Physiotherapy Research International*, 25(3), e1834.
- Holden, R. R. (2010). *The Corsini Encyclopedia of Psychology Face Validity*. The Corsini Encyclopedia of Psychology. Hoboken, NJ: John Wiley & Sons, Inc.
- Nishigami, T., Mibu, A., Tanaka, K., Yamashita, Y., Shimizu, M. E., Wand, B. M., ... & Moseley, G. L. (2018). Validation of the Japanese version of the Fremantle Back Awareness Questionnaire in patients with low back pain. *Pain Practice*, 18(2), 170-179.
- Ehrenbrusthoff, K., Ryan, C. G., Grüneberg, C., Wand, B. M., & Martin, D. J. (2018). The translation, validity and reliability of the German version of the Fremantle Back Awareness Questionnaire. *PLoS One*, 13(10), e0205244.
- Erol, E., Yildiz, A., Yildiz, R., Apaydin, U., Gokmen, D., & Elbasan, B. (2019). Reliability and validity of the turkish version of the Fremantle back awareness questionnaire. *Spine*, 44(9), E549-E554.
- Mahmoudzadeh, A., Abbaszadeh, S., Baharlouei, H., & Karimi, A. (2020). Translation and Cross-cultural Adaptation of the Fremantle Back Awareness Questionnaire into Persian language and the assessment of reliability and validity in patients with chronic low back pain. *Journal of Research in Medical Sciences: The Official Journal of Isfahan University of Medical Sciences*, 25.

10. Rao, P., Jain, M., Barman, A., Bansal, S., Sahu, R., & Singh, N. (2021). Fremantle back awareness questionnaire in chronic low back pain (Frebaq-I): Translation and validation in the Indian Population. *Asian Journal of Neurosurgery*, 16(01), 113-118.
11. Borsa, J. C., Damásio, B. F., & Bandeira, D. R. (2012). Adaptação e validação de instrumentos psicológicos entre culturas: algumas considerações. *Paidéia (Ribeirão Preto)*, 22, 423-432.
12. Sousa, V. D., & Rojjanasrirat, W. (2011). Translation, adaptation and validation of instruments or scales for use in cross-cultural health care research: a clear and user-friendly guideline. *Journal of evaluation in clinical practice*, 17(2), 268-274.
13. Alghadir, A. H., Anwer, S., & Iqbal, Z. A. (2016). The psychometric properties of an Arabic numeric pain rating scale for measuring osteoarthritis knee pain. *Disability and rehabilitation*, 38(24), 2392-2397.
14. Algarni, A. S., Ghorbel, S., Jones, J. G., & Guermazi, M. (2014). Validation of an Arabic version of the Oswestry index in Saudi Arabia. *Annals of physical and rehabilitation medicine*, 57(9-10), 653-663.
15. Juweid, M., Farah, K., Hawamdeh, Z., Alqudah, A., Nowlin, L., Vlaeyen, J., & Trost, Z. (2015). Fear of Movement/(Re) Injury Among Arabic Low Back Pain Patients: Establishing the Validity of the Tampa Scale of Kinesiophobia–Arabic Version. *Myopain*, 23(3-4), 134-142.
16. Schlösser, T. P., Stadhouder, A., Schimmel, J. J., Lehr, A. M., van der Heijden, G. J., & Castelein, R. M. (2014). Reliability and validity of the adapted Dutch version of the revised Scoliosis Research Society 22-item questionnaire. *The Spine Journal*, 14(8), 1663-1672.
17. Weir, J. P. (2005). Quantifying test-retest reliability using the intraclass correlation coefficient and the SEM. *The Journal of Strength & Conditioning Research*, 19(1), 231-240.
18. Feise., R. J., & Michael Menke., J. (2001). Functional rating index: A new valid and reliable instrument to measure the magnitude of clinical change in spinal conditions. *Spine*, 26, 78–87.
19. Dean, K., Walker, Z., & Jenkinson, C. (2018). Data quality, floor and ceiling effects, and test-retest reliability of the mild cognitive impairment questionnaire. *Patient Relat Outcome Meas*, 9, 43–47.
20. Bolarinwa, O. A. (2015). Principles and methods of validity and reliability testing of questionnaires used in social and health science researches. *Nigerian Postgraduate Medical Journal*, 22(4), 195.
21. Schmitt, M. A., Schröder, C. D., Stenneberg, M. S., van Meeteren, N. L., Helders, P. J., Pollard, B., & Dixon, D. (2013). Content validity of the Dutch version of the Neck Bournemouth Questionnaire. *Manual Therapy*, 18(5), 386-389.
22. Tsang, S., Royse, C. F., & Terkawi, A. S. (2017). Guidelines for developing, translating, and validating a questionnaire in perioperative and pain medicine. *Saudi journal of anaesthesia*, 11(5), 80.
23. Hodges, P. W., & Tucker, K. (2011). Moving differently in pain: a new theory to explain the adaptation to pain. *Pain*, 152(3), S90-S98.
24. Wand, B. M., Catley, M. J., Rabey, M. I., O’Sullivan, P. B., O’Connell, N. E., & Smith, A. J. (2016). Disrupted self-perception in people with chronic low back pain. Further evaluation of the Fremantle Back Awareness Questionnaire. *The Journal of Pain*, 17(9), 1001-1012.
25. Lim, C. R., Harris, K., Dawson, J., Beard, D. J., Fitzpatrick, R., & Price, A. J. (2015). Floor and ceiling effects in the OHS: an analysis of the NHS PROMs data set. *BMJ open*, 5(7), e007765.
