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Original Research

Cross-cultural adaptation and validation of the arabic version of the brace questionnaire used for the treatment of adolescents with idiopathic scoliosis

Arabic brace questionnaire in idiopathic scoliosis

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Abstract
Aim: Brace questionnaire (BrQ) is widely used in order to evaluate the impact of brace treatment in adolescent scoliosis on the quality of life. However, it had been translated to different languages, it has not been translated or validated for the Arabic language.
Material and Methods: The Brace questionnaire was translated into Arabic language and back-translated, cross-culturally adapted by experts and according to the international guidelines, then was given to 51 adolescent idiopathic scoliosis patients (46 females and 5 males) were undergoing brace treatment to evaluate its reliability and validity. Reliability was assessed using Cronbach's alpha for internal consistency and intraclass correlation coefficient (ICC) values for test-retest reliability with a 1-week interval between the tests. Concurrent validity had been made using Pearson's Correlation Coefficient by correlating the brace questionnaire and the scoliosis research society-22 questionnaire.
Results: The Cronbach's alpha of the Arabic BrQ was 0.918, the intraclass correlation coefficient (ICC) was 0.938, and the Pearson correlation coefficient between the Arabic Brace questionnaire and Scoliosis research society 22 was 0.758 ($p < 0.001$).
Discussion: The translated BrQ demonstrated a very good correlation between the Arabic brace questionnaire and the scoliosis research society 22, internal consistency values and concurrent validity were comparable to those of prior studies, wearing the brace and keeping it on for a long time has been shown to have negative effects on overall life quality. Treatment of scoliosis with a brace should not be restricted to clinical and radiological aspects, but should also involve therapeutic education regarding the quality of life.

Keywords
Brace Questionnaire, Quality of Life, Adolescent Idiopathic Scoliosis

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Introduction

Scoliosis is a three-dimensional deformity characterized by spinal deviation in the frontal plane, decreased kyphosis in the sagittal plane, and fixed vertebral rotation in the transverse plane [1]. Adolescent idiopathic scoliosis is considered the most common type affecting children around puberty [2].

Early diagnosis and treatment are critical in limiting the progression of the curve [3]. I would like this sentence to be removed. Patients with progressive idiopathic scoliosis above 25° but still undergrowth and before maturity, are advised to use the brace alone or in combination with exercises, which showed better results in correcting the curve progression, improving Cobb angle, respiratory functions and back muscle endurance than those used exercises alone (without bracing) [4, 5].

Bracing involves wearing a brace for about 18 hours, which may increase up to 23 per day till skeletal maturity [4, 6]. The adolescent's life and quality of life are adversely affected by idiopathic scoliosis in addition to wearing the brace during everyday time; sleeping, eating, schooling for several years, creating physical and psychological stresses. Such stresses not only in adolescent patients, but affect the whole family, therefore the influence of bracing on quality of life need to be addressed [7].

The Arabic version of the Scoliosis Research Society 22 questionnaire is valid and reliable to assess health-related quality of life in adolescents with spinal deformities. It is made up of 22 items that are scored in five categories (1–5), with higher scores indicating a higher quality of life. However, it does not consider bracing treatment and how it affects the quality of life [8].

The Brace questionnaire is a valid and effective measuring tool, designed to evaluate the quality of life of patients with adolescent idiopathic scoliosis wearing a brace. It is mainly composed of 34 items organized into eight domains (general health perception, physical functioning, emotional functioning, self-esteem and aesthetics, vitality, school activity, bodily pain, and social functioning) [9]. It has already been validated and culturally adapted for different languages such as English, Greek [9], Italian [10], Chinese [11, 12], French [13], Turkish [14], Polish [15], Persian [16], and Korean [17], but it hasn't been validated for the Arabic language yet. Thus the purpose of this study was to perform a cross-cultural adaptation of the brace questionnaire (BrQ) into the Arabic language and then test its validity and reliability on adolescents with idiopathic scoliosis.

Materials and Methods

Study design

The reliability and validity of the Arabic version of the brace questionnaire used for the treatment of adolescent idiopathic scoliosis were investigated using a prospective cross-sectional design. The study was approved by the Ethics Committee of Faculty of Physical Therapy, Cairo University (P.T.REC/012/003140). The research was conducted between February 2021 and October 2021.

Participants

Fifty-one male and female adolescents with idiopathic scoliosis, aged between 9 to 18 years, wearing a brace for at least 3 months, were recruited from scoliosis medical clinics with no history of previous spinal surgery or deformity rather than idiopathic scoliosis, and no systemic or infectious diseases met the inclusion criteria. All patients and their parents signed consent forms before participating in the study, and they were informed about the research goals, any participant or parent who refuses to finish can withdraw at any moment. Initially, demographic data, curve shape, type, location, Cobb's angle of the main curve, date and time of brace wearing, prescribed treatment, in addition to contact information were all documented in the datasheet.

Material and Methods

Brace questionnaire was created in order to assess how well scoliosis patients are doing after wearing a brace, 34 questions in total, divided into eight categories [9]. The answers are grouped into either ''always'', ''most of the time'', ''occasionally'', or ''never''. Each question is assigned a value, and the total is multiplied by 20 during the scoring process. To arrive at a final score, multiply the sum of all individual scores by 34. The entire questionnaire should take between 10 and 12 minutes to complete. The scores range from 20 to 100. A high score indicates a higher quality of life.

Scoliosis research society-22 questionnaire consists of five domains, function/activity, pain, self-image/appearance, mental health, and satisfaction with management, each item's score ranges from 1 to 5, with a total score ranging between 22 and 110 [18]. Arabic translation of the SRS-22 questionnaire was developed and tested for reliability and validity among Arabic-speaking idiopathic scoliosis patients [19].

The Brace questionnaire was translated into Arabic language and cross-culturally adapted according to Wild et al's guidelines [20]. Regarding the preparation phase of Wild et al., it was not necessary to ask and take permission from the BrQ authors, because the Brace Questionnaire is not copyright protected. At first, the Brace questionnaire was translated from English to Arabic by two independent translators from the department of linguistics, Ain Shams University.

A single Arabic translation of the questionnaire was created after the differences between the two versions of the questionnaire were set out. After that, the combined text was back translated into its original language. After that, the back translation was examined to see how it compares to the original questionnaire. Then experts in the physical therapy and medical field, whose mother tongue is Arabic, examined the translation. Eight patients with adolescent idiopathic scoliosis took part in a cognitive debriefing to see how well the Arabic version of the questionnaire translates. The results of this cognitive debriefing were reviewed and finalized by interpreting the pilot testing results and checking for any misconceptions. Before writing a final report documenting the translation process, the final Arabic revision was proofread to look for mistakes. Then each patient was asked to complete the questionnaires. The translated Arabic BrQ and the Arabic version of SRS-22 were administered in the same setting and the patients were instructed to set up a second setting 1 week later to re-complete the brace questionnaire [13], or if this was not possible to some individuals, questionnaires were sent and received via e-mail. the scores were calculated according to Vasiliadis et al. [9].

Data processing & Statistical analysis

This part of the study is intended to present the collected data of the brace questionnaire through measuring Concurrent validity, which was done using Pearson's Correlation Coefficient (r). Correlation values of 0.40 or above were considered satisfactory (r ≥ 0.81–1.0 as excellent, 0.61– 0.80 very good, 0.41–0.60 good, 0.21–0.40 fair, and 0–0.20 poor) [21, 22].

Reliability assessment of the Arabic version of the brace questionnaire was determined by calculating Cronbach's α for internal consistency and intraclass correlation coefficient (ICC) values for test-retest reliability. Cronbach's alpha ranges from 0 to 1 and values ≥0.7 indicate adequate internal consistency for scale, Test-retest reliability was examined using the Intraclass Correlation Coefficient (ICC). Values of ICC vary from 0 (totally unreliable) to 1 (perfectly reliable) and values above 0.80 were considered as evidence of excellent reliability [23].

All Statistical analyses were carried out using SPSS version 23.00 software (IBM Corporation, Illinois, USA). Alpha level was set at 0.05.

Results

-Descriptive statistics.

Descriptive Analysis of subjects' general characteristics

As shown in Table 1, the study group consisted of 51 patients (5 boys and 46 girls), with mean age, body mass, height, and BMI values of 14.05±2.53 years, 49.29±10.73 kg, 155.97±9.19 cm, and 20.06±3.40 kg/m2 , respectively.

-Intra rater reliability of brace questionnaire

Table 2 and Figure 1, show the Brace questionnaire at the 1st and 2nd occasions by the same tester (intra-rater reliability). The total value brace questionnaire mean ±SD was (70.5±12.83) for the first reading of the main tester and (71.24±12.10) for the second reading for the same tester after one week. The intra-rater reliability using the Intra-class Correlation Coefficient (ICC) showed that there was a high reliability of pain subscale (with ICC=0.938 and P-value=0.0001*).

Internal consistency (correlation of items in the questionnaire)

The internal consistency was measured by Cronbach's alpha. Results revealed that the internal consistency of observer scale of the brace questionnaire was high with Cronbach's alpha = 0.918. Which confirms a very high level of internal consistency of the brace questionnaire.

Validity of Arabic Brace questionnaire

Concurrent Validity

The concurrent validity was tested by correlating the Arabic Brace questionnaire with a measure of Scoliosis research society 22 (r < 0.20 = poor; 0.21 < r < 0.40 = fair; 0.41 < r < 0.60 = good, 0.61 < r < 0.8=very good, r >0.80= excellent).

Concurrent validity was assessed by calculating the Pearson correlation coefficient between the Arabic Brace questionnaire with a measure of Scoliosis research society 22 (Table 3).

The Pearson correlation coefficient (r) between the mean value of Arabic Brace questionnaire with the mean value of Scoliosis research society 22 was 0.758. The results indicated that Scoliosis research society 22 was significantly associated with Arabic Brace questionnaire (p-value=0.0001*). The overall correlation between the two administrations was very good.

Table 1. Gender distribution in the study group.

Group	Study group	
Gender	**Male**	**Female**
Frequency	5	46
Percent	9.8%	90.2%

Table 2. Intra-class Correlation Coefficient (ICC) for test and retest Intra rater reliability of Brace questionnaire:

	Brace questionnaire	
	1st reading	**2nd reading**
Mean	70.5	71.24
±SD	±12.83	±12.10
ICC	0.938	
P-value	0.0001	
Significance level	Significant	

Table 3. Concurrent validity analysis: Pearson Correlation Coefficients between Arabic Brace questionnaire with a measure of Scoliosis research society 22:

Variables	Arabic Brace questionnaire	Scoliosis research society 22
Mean±SD	70.5±12.83	78.76±14.38
r	0.758	
p-value	0.0001*	

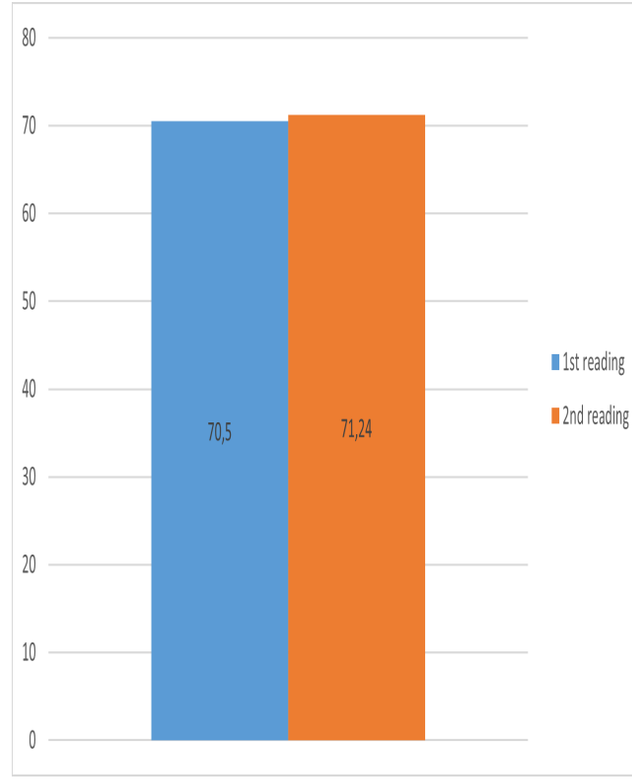

Figure 1. Mean values of brace questionnaire for the same observers in the 1st and 2nd readings.

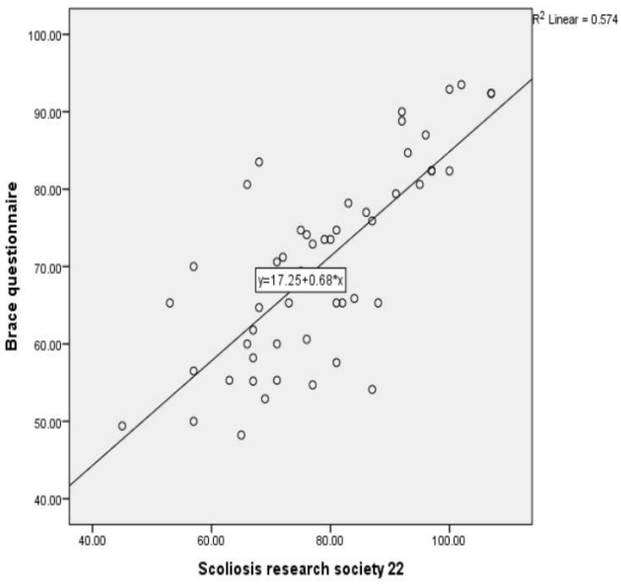

Figure 2. Scatter plot to show correlation of the mean value between Arabic Brace questionnaire with a measure of Scoliosis research society 22.

Discussion

The BrQ was translated and culturally adapted in several countries, but there was no Arabic version available, and the findings of our study supported the use of the culturally adapted Arabic BrQ in adolescents with idiopathic scoliosis wearing a brace. In conclusion, the translated BrQ revealed a very good correlation between the Arabic brace questionnaire and the scoliosis research society 22 with the Pearson correlation coefficient (r) 0.758, a high level of internal consistency (Cronbach's alpha = 0.918), and excellent reliability (ICC=0.938). The findings of this study were comparable to those of previous studies with internal consistency 0.82 [9], 0.94 [10], 0.89 [11], 0.96 [12], 0.85 [13], 0.95 [14], 0.94 [15], 0.96 [16], and 0.913 [17].

The translated BrQ concurrent validity of our study was also comparable to previous studies with Pearson correlation coefficient (r) 0.826 [10], 0.743 [12], 0.64 [14], and 0.712 [17].

As known, wearing the brace and its daily duration have a negative impact on overall life quality [7]. The use of a brace to treat scoliosis should not be limited to the clinical and radiological aspects of the deformity, but should also include therapeutic education about quality of life throughout the treatment period [13], for that reason, improving the quality of life is important to increase treatment compliance among scoliosis brace wearers, positively impacting the treatment quantity [24].

Limitations

The cross-sectional design of the current study, as well as the small sample size available in the cross-cultural adaptation process, limited this study, however, the English, French, Italian, Turkish versions had a smaller sample size compared to our sample and the Persian was similar to our study.

Conclusion

The Arabic version of the brace questionnaire was valid, reliable with high internal consistency. The current findings indicate that the Arabic BrQ is a useful instrument for assessing the quality of life of adolescent idiopathic scoliosis patients who are being treated with a brace. We recommend using a larger sample size in future research and using the Arabic version of the BrQ to evaluate its ability to detect changes in brace-related quality of life.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

None of the authors received any type of financial support that could be considered potential conflict of interest regarding the manuscript or its submission.

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