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Translation and Cultural Adaptation to Portuguese of the Long Head of Biceps Tendon Score*

Tradução e adaptação cultural à língua portuguesa do Long Head Biceps Score

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Abstract

Objective To translate and culturally adapt the Long Head of Biceps Tendon (LHB) score into Brazilian Portuguese.

Methods The process involved translations by professionals fluent in the target language, followed by independent back translations. Next, a committee compared the original and translated versions, pretested the final version, and concluded it.

Results We translated and adapted the questionnaire according to the proposed methodology. In the first version in Portuguese (VP1) there was divergence regarding the translation of twelve terms. Compared to the original version, the back translation of VP1 presented eight diverging terms. A committee prepared a second version in Portuguese (VP2) and applied it to a pretest group consisting of 30 participants. Finally, we conceived the third version in Portuguese, called LHB-pt.

Conclusion The translation and cultural adaptation into Brazilian Portuguese of the LBH score was successfully accomplished.

Keywords
- LHB score
- tenodesis
- tenotomy
- long head biceps tendon

* *Study developed at the Shoulder Surgery Service of Hospital Ortopédico BH (Belo Horizonte, Minas Gerais, Brazil) and the Department of Orthopedics and Traumatology of Universidade Federal de São Paulo (São Paulo, São Paulo, Brazil).*

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Resumo

Objetivo Realizar a tradução e adaptação cultural à língua portuguesa do Long Head of Biceps Tendon (LHB).

Métodos O processo envolveu a produção de traduções por indivíduos com domínio da língua-alvo, retrotraduções de maneira independente, criação de um comitê para comparar as versões original e traduzida, realização de pré-teste com a versão final, e elaboração da versão final.

Resultados O questionário foi traduzido e adaptado conforme a metodologia proposta. Na primeira versão em português (VP1), houve divergências na tradução de doze termos. A retrotradução da VP1 apresentou, quando comparada à versão original, divergência em oito termos. A segunda versão em português (VP2), elaborada por um comitê, foi aplicada a um grupo pré-teste constituído por 30 participantes, e ao final chegou-se à terceira versão em português, denominada LHB-pt.

Conclusão A tradução e adaptação do LHB foram concluídas com sucesso.

Palavras-chave

- LHB score
- tenodese
- tenotomia
- tendão da cabeça longa do bíceps

Introduction

Injuries to the tendon of the long head of the biceps are a significant cause of shoulder pain,[1] especially on the anterior surface, with potential irradiation along its course through the arm.[2] The symptoms usually result from instability, inflammation, or local trauma.[3] The incidence of pain ranges from 36% to 83%, and it is higher according to the severity of associated rotator cuff injuries.[4,5]

Several clinical tests aid in the diagnosis. The Speed test,[6] which is widely accepted and used in the academic environment, has high sensitivity (90%) and low specificity (13.8%).[7]

Complete rupture of the LHB fibers causes a cosmetic deformity known as Popeye sign, which is an increase in the volume of the distal region of the arm, on the anterior surface, resulting from the distal migration of the muscle belly. In a systematic review[8] of 699 tenotomies, the authors reported that this deformity occurs in 43% of the cases. According to the Brazilian literature,[9–12] its incidence ranges from 8.3% to 59.1%. Several factors influence the identification of this sign, including age, the experience of the evaluator, and obesity (especially when the patient has a body mass index [BMI] $> 30\,kg/m^2$).[9,10,13] The Popeye sign is a critical outcome in studies assessing the treatment of biceps injuries.

The biceps brachii acts in forearm supination and elbow flexion; in addition, it makes a small contribution to shoulder flexion.[14] Electroneuromyographic studies[15] have shown that the muscle belly of the long head of the biceps contributes to the dynamic stabilization of the glenohumeral joint, especially during flexion and abduction. A retrospective isokinetic evaluation study[16] involving tenotomized patients with a 7-year follow-up showed 7% of loss in maximal forearm flexion strength and 9.1% of loss in maximal forearm supination strength. Other authors[17] have observed a higher loss of supination strength due to complete tendon rupture. The Brazilian literature has also reported these changes; however, the loss of strength was not higher in patients with more evident Popeye sign.[18]

The wide variety of outcomes associated with this structure has led to the development of the Long Head of Biceps Tendon (LHB) score,[19] which is a functional, specific questionnaire applied by an examiner comparing both shoulders. The LHB score consists of three large domains with different scores: the first one refers to signs and symptoms, the second, to the identification of the Popeye sign, and the third, to the assessment of elbow flexion strength.

In the present study, we describe the process of translation and cultural adaptation of the LHB score into Brazilian Portuguese.

Materials and Methods

The institutional ethics committee analyzed and approved the study. We informed the developers of the score about our intention to translate it, and they consented to it.

Translation and cultural adaptation

The translation into Portuguese and cultural adaptation of the LHB score followed the guidelines proposed by Guillemin.[20] The process included five steps: 1) translation by professionals fluent in the target language; 2) independent back translations; 3) creation of a committee to compare the original and translated versions; 4) pretest of the final version to determine its equivalence with the original test; and 5) adaptation of the weight of the scores per the cultural context.

The translation was made by two translators, native Portuguese speakers and fluent in English. Then, the researchers compared these two versions to generate a consensual first version in Portuguese (VP1). The terms *patient name*, *date of examination*, and *date of birth*" were excluded from the translation as they are not part of the score.

The back translation started following the completion of the VP1. After choosing the terms for the VP1, the researchers designed the LHB form using the same graphic and image standards as those of the original score. A third translator, a native English speaker fluent in Portuguese,

also blinded to the study, evaluated the VP1 and made the back translation.

The professionals who prepared the VP1 and the one who did the back translation were unaware of the purpose of the study.

The third step was the creation of a committee, consisting of three translators, three researchers, and three orthopedists who specialized in shoulder surgery, which compared the original version, the VP1, and the back translation. Based on this analysis, the terminology used in the second Portuguese version (VP2) was determined by consensus. The committee assessed semantic (word meaning), idiomatic (idioms and colloquialisms), and conceptual (concept validity) equivalences through practical experience.

The pretest stage began after the completion of the first three steps. Then, the principal investigator recruited 30 male and female Brazilian subjects, aged 18 to 80 years, who presented partial or subtotal rupture of the long head of the biceps tendon, superior labrum anterior to posterior (SLAP) injuries, or bicipital tendon instability with pulley or rotator cuff injury. They underwent arthroscopic surgical treatment and were followed up for at least one year. We excluded patients with calcified tendinitis, glenohumeral

Table 1 Divergences between translators and specialists in the development of the first version in Portuguese (VP1)

Item	Original	Translator A	Translator B	VP1
Pain/Cramps*	Pain/Cramps (max. 50 points)	Dor/Cãibras (máx. 50 pontos)	Dor/Cólica (Máximo 50 pontos)	Dor/Cãibras (máx. 50 pontos)
Severe*	Severe	Severa	Severa	Grave
None	None	Nenhuma	Nenhuma	Nenhuma
LHB – pain	LHB – pain	Dor LHB	Dor LHB	Dor na cabeça longa do bíceps
Right side	Right side	Lado direito	Lado direito	Lado direito
Left side	Left side	Lado esquerdo	Lado esquerdo	Lado esquerdo
Tenderness*	Tenderness over the bicipital grove	Maciez ao redor do sulco bicipital	Sensibilidade no sulco bicipital	Sensibilidade no sulco bicipital
Speed-test*	Speed-test	Teste de velocidade	Teste rápido	Teste de Speed
Cramps*	Cramps	Cãibras	Cólicas	Cãibras
At rest*	At rest	Em repouso	Sem esforço	Em repouso
On exertion*	On exertion	Em esforço	Com esforço	Em esforço
None	None	Nenhuma	Nenhuma	Nenhuma
Cosmesis*	Cosmesis (max. 30 points)	Cosmética (máx.30 pontos)	Cosmese (máximo 30 pontos)	Estética
Patient-dependent deformity*	Patient-dependent deformity	Percepção do paciente em relação à deformidade	Deformidade do paciente dependente	Percepção do paciente em relação à deformidade
None	None	Nenhuma	Nenhuma	Nenhuma
Mild*	Mild	Fraca	Suave	Leve
Moderate	Moderate	Moderada	Moderada	Moderada
Severe*	Severe	Severa	Severa	Grave
Examiner-dependent deformity*	Examiner-dependent deformity	Percepção do examinador em relação à deformidade	Deformidade do examinador dependente	Percepção do examinador em relação à deformidade
Elbow flexion strength	Elbow flexion strength (max. 20 points)	Força de flexão do cotovelo (máx. 20 pontos)	Força de flexão do cotovelo (máximo 20 pontos)	Força de flexão do cotovelo (máx. 20 pontos)
Affected side	Affected side	Lado afetado	Lado afetado	Lado afetado
Opposite side	Opposite side	Lado oposto	Lado oposto	Lado oposto
Total	Total	Total	Total	Total

Abbreviations: LHB, long head of the biceps; max., maximum; máx., máximo.
Notw* Terms in which divergences were observed between the translators, and/or divergences with the VP1 developed by the researchers.

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arthrosis, or associated neurological injury. The exclusion criteria were patients with deafness, aphasia, or any cognitive deficit that directly limited their understanding of the test.

The selected patients filled out an informed consent form (ICF) before the pretest. Then, the principal investigator read VP2 aloud. If any of the terms were not understood by the participant, the researcher could explain the meaning in their own words. Then, the participant could suggest a new word which, in their opinion, provided a clearer definition in Brazilian Portuguese. We reformulated items with a non-understanding rate of 15% or more using the definitions proposed by the participants to develop the third Portuguese version (VP3).

Results

►**Table 1** shows the terms presented by translators A and B, as well as the VP1. In the first step of the process, twelve cases of divergence were observed.

►**Table 2** shows the back translation, in which eight cases of divergence in the translation were observed regarding the original version. This table also describes the terms chosen by the committee for the VP2.

►**Table 3** presents the descriptive analysis of the group submitted to the pre-test. The sample was mainly composed of female patients with an average age of 62.3 years; the right side was the most affected. The postoperative follow-up ranged from 1 to 6 years.

Table 2 Summary of divergences between translators and specialists in the development of the second version in Portuguese (VP2)

Original version	VP1	Back translation	VP2
Pain/Cramps (max. 50 points)*	Dor/Cãibras (máx. 50 pontos)	Pain/Cramps (max. 50 points)	Dor/Desconforto muscular (máx. 50 pontos)
Severe*	Grave	Severe	Intensa
None	Nenhuma	No pain**	Nenhuma
LHB – pain	Dor na cabeça longa do bíceps	Pain on the biceps brachii long head**	Dor na cabeça longa do bíceps
Right side	Lado direito	Right side	Lado direito
Left side	Lado esquerdo	Left side	Lado esquerdo
Tenderness over the bicipital grove*	Sensibilidade no sulco bicipital	Sensitivity in the bicipital groove**	Dolorimento no sulco bicipital
Speed-test	Teste de Speed	Speed-test	Teste de Speed
Cramps*	Cãibras	Cramps	Desconforto muscular
At rest	Em repouso	At rest	Em repouso
On exertion*	Em esforço	With effort**	Ao esforço
None	Nenhuma	None	Nenhuma
Cosmesis (max. 30 points)*	Estética (máx. 30 pontos)	Aesthetics (max. 30 points)**	Aspecto estético (máx. 30 pontos)
Patient-dependent deformity*	Percepção do paciente em relação à deformidade	Perception of the patient in relation to the deformity**	Percepção da deformidade pelo paciente
None	Nenhuma	None	Nenhuma
Mild*	Leve	Slight**	Discreta
Moderate	Moderada	Moderate	Moderada
Severe	Grave	Severe	Grave
Examiner-dependent deformity*	Percepção do examinador em relação à deformidade	Perception of the examiner in relation to the deformity**	Percepção da deformidade pelo examinador
Elbow flexion strength (max. 20 points)	Força de flexão do cotovelo (máx. 20 pontos)	Elbow flexion strength (max. 20 points)	Força de flexão do cotovelo (máx. 20 pontos)
Affected side	Lado afetado	Affected side	Lado afetado
Opposite side	Lado oposto	Opposite side	Lado oposto
Total	Total	Total	Total

Abbreviations: LHB, long head of the biceps; max., maximum; máx., máximo; VP1, first version in Portuguese.
Notes:* Terms modified by the committee. ** Terms in which divergences were observed between the original version and the back translation.

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Table 3 Characteristics of the sample to whom the pretest was applied

Gender	n
Male	12
Female	18
Age (years)	
Minimum	45
Maximum	79
Dominant side	
Right	29
Left	01
Laterality	
Right	16
Left	14
Shoulder procedure	
Arthroscopic repair of the rotator cuff	30
Biceps procedure	
Tenotomy	19
Tenodesis	11

At the end of this stage, the final version of the Brazilian Portuguese translation of the LHB score, called LHB-pt was concluded (►**Figure 1**).

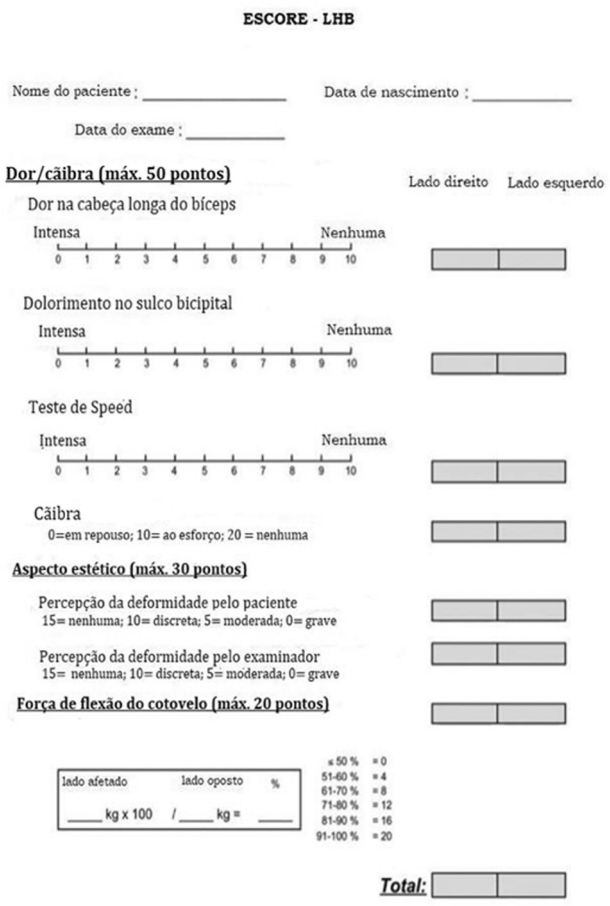

Fig. 1 LHB-pt.

Discussion

The most significant result of the present work is that the LHB-pt score will be made available for public use. This score is a practical tool with great potential in studies involving the long head of the biceps tendon.

Several authors have demonstrated that general scores to assess shoulder function, such as the Constant-Murley score, are not helpful in the follow-up of patients with conditions affecting the long head of the biceps tendon. In addition, these scores do not enable the detection of differences between bicipital tenotomy and tenodesis.[21–24] In a comparative functional assessment using the LHB score, Schiebel et al.[25] could observe differences among patients undergoing distinct bicipital tenodesis techniques.

The LHB score is more specific for this type of assessment because it includes outcomes that several authors deem fundamental.[8–10,21–24,26–28] However, its accuracy is limited because there may be an overlap with symptoms from rotator cuff injury. Therefore, the LHB score is not useful to screen for lesions before surgery.[19]

In a study regarding the translation and cultural adaptation of the LHB score into Turkish, the authors[29] assessed its reproducibility, validity, and reliability. They[29] concluded that the questionnaire was reproducible (interclass coefficient: 0.940; $p < 0.001$), valid (Cronbach alpha: 0.640), and reliable, as it remained stable throughout the testing and retesting processes. Although we did not evaluate the properties of the test, we believe that we may extrapolate these findings to the LHB-pt.

Some modifications occurred after the analysis of the VP1 and the back translation by the expert committee. The committee changed the term *dor/cãibra* (*pain/cramp*) to *dor/desconforto muscular* (*pain/muscle discomfort*) due to the belief that *cãibra* defines a very intense muscle discomfort in the Brazilian sociocultural context. As the score intends to identify the intensity of muscle discomfort, it would not be proper to use a term that culturally already defines it as intense. However, during the pretest, 14 patients (46%) suggested replacing *desconforto muscular* with *cãibra*. Thus, researchers decided to use *cãibra* in the final version of the score.

We changed the term *grave* (*severe*) to *intensa* (*intense*). The latter is better associated with the degree of muscle pain and discomfort, whereas *grave* can indicate a subjective worsening of the patient's condition, with no quantitative evaluation.

In addition, we changed *sensibilidade no sulco bicipital* (*bicipital sulcus tenderness*) to *dolorimento no sulco bicipital* (*bicipital sulcus soreness*). This change occurred because *sensibilidade* (*tenderness*), in the Brazilian context, is more related to a sensory ability, be it tactile, thermal, or related to pain. The committee believes the score does not intend to

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identify the sensory capacity of the bicipital sulcus but rather the sensation of pain on local palpation. Therefore, we opted for the term *dolorimento* (*soreness*).

We suggested some modifications to adapt to the syntactic context of Brazilian Portuguese. Therefore, *em esforço* (*on exertion*) was altered to *ao esforço*. Likewise, the terms *percepção do paciente em relação à deformidade* (*patient-dependent deformity*) and *percepção do examinador em relação à deformidade* (*examiner-dependent deformity*) were respectively altered to *percepção da deformidade pelo paciente* and *percepção da deformidade pelo examinador*.

The term *estética* (*cosmesis*) was altered to *aspecto estético*, a more didactic way for the patient to understand that this item evaluates the physical features of the affected site. The committee chose to use the terms *nenhuma* (*none*), *discreta* (*mild*), *moderada* (*moderate*), and *grave* (*severe*) to assess the degree of deformity perceived by the patient. Among these terms, only *discreta* was not included in the VP1 and was chosen for the VP2. This occurred because the committee believed that a potential change in cosmesis would be better graded as *discreta* instead of *leve* (the usual translation for *mild*).

It is worth mentioning that the first question of the tool refers to pain in the long head of the biceps. While applying the test, evaluators may have doubts on how to measure pain. Scheibel et al.[25] say that this parameter should be assessed as the perception of spontaneous pain in the anterior aspect of the shoulder. There was no change in this methodology when we adapted and translated the score. It is also important to clarify that, according to the developers of the score,[19] a dynamometer must determine elbow flexion strength, and this measurement must be repeated three times. The mean flexion strength of the affected limb is compared with that of the healthy contralateral limb. The percentage results are scored from 0 to 20 points. Strength higher than 91% results in 20 points; from 90% to 81%, 16 points; from 80% to 71%, 12 points; from 70% to 61%, 8 points; and from 60% to 51%, 4 points. Strength below 50% receives no points.

We believe that the objective nature of the answers associated with direct questions facilitates the use of the LHB score in the clinical practice. Despite the great diversity of regionalisms and barbarisms in Brazil, the questionnaire is easy to understand. Moreover, it has great applicability in studies that assess the long head of the biceps tendon.

The limitations of the present study include the lack of assessment of the reproducibility and reliability of the test. We believe that future publications may identify these properties.

Conclusion

The translation and cultural adaptation of the LHB score into Brazilian Portuguese, which generated the LHB-pt, were successfully accomplished.

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Conflict of interests
The authors have no conflict of interests to declare.

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