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Original Article

Translation and Cross-Cultural Adaptation of the Arabic Version of the Patient Reported Impact of Spasticity Measure.

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Abstract

Aims & Objective: The Patient Reported Impact of Spasticity Measure (PRISM) is a self-reported questionnaire that is used to assess the impact of spasticity on the quality of life of individuals with spinal cord injury (SCI). Its inclusion in the assessment process for patients living in a country such as Saudi Arabia, which has one of the highest incidences of SCI around the world, will be an integral addition. Aims: The aims for this study were to translate and cross-culturally adapt the PRISM into Arabic and pilot test the Arabic version on Arabic speakers with SCI in Saudi Arabia. **Methodology:** Translation process was administered according to the recommended guidelines used for cross-cultural adaptation of healthcare measures. Methods and Material: Pilot testing of the PRISM-Arabic was administered to 35 individuals with SCI presenting with spasticity. Participants were interviewed to assess the relevance of the questionnaire to the Arabic language and culture. Face and content validity of the PRISM-Arabic as well as its floor and ceiling effects were assessed. **Results:** During the translation process, the expert committee made changes in 14 occasions due to cultural equivalence differences. Pilot-testing showed eight items that needed further adaptation. After all were made, the cross-culturally adapted PRISM-Arabic showed adequate face and content validity and did not have flooring and ceiling effects. **Conclusions:** The PRISM has been successfully translated and cross-culturally adapted into Arabic language. Further assessments of its psychometric properties are recommended. Implications for its use in clinical practice and research were presented.

Key Words: Spinal cord injury, Spasticity, Patient Reported Impact of Spasticity Measure, PRISM, Saudi Arabia.

Introduction

Spinal cord injury (SCI) is a devastating neurological condition that can result in significant disability. It

results in varying degrees of loss of sensory, motor and autonomic function, all of which can have a great impact on the individual's medical and emotional status.[1–3] Spasticity is a sequela that is present in 65 to 78% of the population with chronic SCI.[4,5] This impairment results from an imbalance between messages from the central nervous system to the muscles causing an increased excitability referred by patients or clients as tightness, stiffness, or increased pull of muscles.[6–8]

Problems that arise because of spasticity are numerous, and it is generally considered by patients and clinicians to have a negative impact on limiting functional capacity and activities of daily living (ADL).[9–12] However, there are suggestions that symptoms of spasticity may facilitate the performance of some ADL and transfers, increase stability in sitting and standing, increase muscle bulk and strength of spastic muscles, and increase venous return.[13–15] This potential for a beneficial effect of spasticity on quality of life (QOL) has an impact upon decisions regarding its management.

Standardized clinical assessment tools for spasticity are often used to measure the clinical presentations, frequency, and severity of the spasticity. However, there has been a change in recent years to focus on standardizing the measurements of the client's overall activity and functional status.[16] Therefore, researchers suggested that a single tool is not enough, but rather a battery of tools will be needed to assess the impact of spasticity. Additionally, clinical assessment of muscle tone-related spasticity should be complimented by a spasticity-specific self-rating tool to capture the physical, emotional, and social impact of spasticity on an individual.[17–19]

The Patient Reported Impact of Spasticity Measure (PRISM) is an instrument that was developed by Cook et al.[20] specifically for individuals with SCI. It is a questionnaire that standardizes the collection of self-report information relevant to the clinical assessment of the impact of abnormal muscle control or involuntary muscle movement on QOL.[20] Its assessment is done with respect to its seven sub-scales, which include social avoidance/anxiety, psychological agitation, daily activities, need for assistance/positioning, positive impact, need for intervention, and social embarrassment. It accounts for both the negative and positive aspects associated with spasticity. It has 41 items with a five-point Likert scale. Sub-scale scores are obtained by averaging item scores and multiplying by the number of items. The higher the score, the more negative the impact is reported by the respondent.[20]

The PRISM demonstrated good reliability in terms of internal consistency (Cronbach's α = 0.74 to 0.96) and reproducibility (ICC = 0.82 to 0.91). Further work is still required to establish psychometric properties for its use with the SCI population, especially with respect to validity (construct, discriminative, and convergent).[20]

The PRISM's inclusion as part of the assessment process given to patients with spastic SCI will be an integral addition.[21] However, it is currently limited to English speakers in the United States. Its use has not spread worldwide except in Serbia where it has been translated to the Serbian language and tested on Serbian patients with multiple sclerosis (MS) only.[22] Therefore, providing a version of the PRISM for use among an Arabic population will be a helpful step to the PRISM's generalizability and usability in a population with SCI. This study took place in Saudi Arabia, a country with one of the highest incidences of SCI around the world,[23–25] and applied the Modern Standard Arabic language (MSA) throughout the translation process to help generalize the use of the PRISM in all Arabic speakers with SCI.[26–28]

The purpose of this study was to produce an Arabic version of the PRISM to be used with Arabic speaking individuals with SCI. The aims of the study were: 1) to translate and cross-culturally adapt the PRISM questionnaire into Arabic language, and 2) to pilot test the produced Arabic version with individuals with SCI.

Methodology

This cross-cultural study was approved by the Institutional Review Boards of Texas Woman's University in Houston, Texas, United States, and the two data collection sites, Sultan Bin Abdulaziz Humanitarian City (SBAHC) and King Fahad Medical Hospital (KFMC) in Riyadh, Saudi Arabia.

Translation and Cross-Cultural Adaptation Process: The process of translation and cultural adaptation was planned and carefully implemented using the guidelines given by Beaton et al[29] for cross-cultural adaptation of self-reported measures. These were as follows:

- Forward translations. In this stage, two bilingual translators whose native language was Arabic

performed the forward translation of the original English version of the PRISM into Arabic using the MSA language. These two translators were independent and had different backgrounds. One of them had knowledge of the target population (patients with SCI) and the purpose of this study. His role was to modify unexpected meanings to be recognized and understood by the population of interest during the second stage of the translation process. The other translator had knowledge about the purpose of the study only. Both translators produced two separate Arabic translated versions of the PRISM (T1 and T2).

- Synthesis. In this stage, the two forward translators met together to synthesize the results of their translations. The process was done by reviewing, comparing and synthesizing the two resulting Arabic translated versions from stage one (T1 and T2) with the original (English version) PRISM. The purpose for this step was to produce one synthesized Arabic version of the PRISM (T3) with a report documenting the challenges they had following their discussion and consensus.
- Back translations. The purpose of this stage in the cross-cultural adaptation process was to validate and consolidate the synthesized Arabic version of the PRISM produced in stage two (T3). Two independent bilingual translators performed the back translation to English language. The two back translators were independent and were unaware of the original English PRISM and purpose of this study. They both had no medical background to avoid information bias. This process produced two back-translated English versions of the PRISM (T4 and T5).
- Expert committee. To assure the achievement of cross-cultural equivalence, the expert committee was formulated with two methodologists, a physical therapist (PT), a language professional, and the principal investigator (also a PT). One methodologist had previous experience in cross-cultural adaptation of tools to Arabic language in Saudi Arabia. The other methodologist has experience developing patient satisfaction surveys within hospital settings. Both methodologists were experts in questionnaire development for Arabic speakers. Their role was to help in translation and to give input ensuring translation equivalence, cultural relevance, and the validity of the backward translation method followed during the translation stage. The PT has worked closely and extensively with patients with SCI. His role was to give input on patients' perspectives about relevant wording used in the questionnaire. The language professional is a translator who works closely with the targeted population. He translates between Arabic-speaking patients and English-speaking healthcare professionals. All experts were bilingual and had previous knowledge about the concept of this study and its purpose.

The committee reviewed all the translations: two forward translations (T1 and T2), the synthesized translation from the forward translation stage (T3), and the two back translations (T4 and T5). They discussed the challenges and discrepancies that were found that did not reflect the original version of the PRISM. After significant modifications, the committee came up with critical decisions made to achieve semantic, idiomatic, experiential, and conceptual equivalence between the original PRISM and the Arabic-translated PRISM (PRISM-Arabic). Questionable words and phrases were replaced with ones believed to be reasonable adaptations into the Saudi Arabian culture. This process created the pre-final version of the PRISM-Arabic (T6) and was ready to be field tested.

Pilot Testing of the Pre-Final Version of the PRISM-Arabic

Thirty-five participants were recruited for this pilot study. Using convenience (consecutive) sampling approach, individuals with SCI who reported spasticity and had been admitted for rehabilitation as an in-patient or out-patient in the hospitals were recruited. These two hospitals (SBAHC and KFMC) are the largest rehabilitation centers in Saudi Arabia, serving patients from all over Saudi Arabia and its neighboring countries. Inclusion criteria were an age minimum of 18 years and ability to read, speak and understand Arabic. In addition, they must have sustained a SCI more than three months prior to the day of testing. Those who were pregnant or had been diagnosed with psychological- or cognitive-related complications that might interfere with their rehabilitation program or how they will respond to the questionnaire were excluded from the study. Other exclusion criteria included active infection, open wounds, heterotopic ossification/myositis ossificans, or other acute musculoskeletal injuries.

All participants read and signed a written informed consent in Arabic for participation approved by the Institutional Review Board of the university and the corresponding hospital or center where the participant was being treated.

Participants were asked to independently complete the pre-final version of the PRISM-Arabic (T6) produced from stage four of the translation and adaptation process. They were asked to respond freely and honestly to all items in the questionnaire and then were interviewed independently. In the interview, participants were probed about the meanings of each item, and to address those items that were difficult or needed to be changed. They were also asked to suggest a better or easier form of language for difficult items in the questionnaire. Lastly, they were asked if they thought that the questionnaire was relevant and appropriate to their experience with spasticity (see Appendix A for PRISM-Arabic).

All data analyses were calculated using SPSS® for windows, version 25 (IBM Corp. Armonk, NY). The means and standard deviations of the demographic variables (including the American Spinal Injury Association (ASIA) Scale,[1] employment status, marital status, and level of education) were calculated to describe study participants. Independent sample *t*-tests were used to analyze the differences between demographic groups on the number of difficult or misunderstood items reported by participants. Face validity was determined upon participants' responses to the interview questioning on relevance and appropriateness of the scale to their experience with spasticity. The content validity was determined if the expert committee members reached a consensus concerning the relevance and appropriateness of the scale to those Arabic speaking individuals with SCI affected by spasticity. The floor and ceiling effects of the PRISM were determined by computing the percentage of participants scoring lowest or highest. The scale was considered to have flooring or ceiling effect when more than 15% of the participants had the lowest or highest possible score.

Table 1: Arabic Adaptation of Words and sentences from the original patient reported impact of spasticity measure*

Item	Context From the original prism	Context from the Arabic-translated synthesized version of the prism	Issue with translation equivalence	Expert committee decision
Tool	Patient reported impact of **SPASTICITY** Measure	**الشلل التشنجي** spasticity has no equivalent term in Arabic Language	Vocabulary Equivalence	Changed to: الشد العضلي العصبي
Introductory context	**abnormal** muscle control	**الخلل** abnormal has many equivalent terms in Arabic language	Vocabulary Equivalence	Changed to: الاضطراب
Items: 3,10,17, 21,33,38	Difficult for (or helped) me or my **attendant**	**أحد** Back translated to: *"someone"*	Conceptual Equivalence	Changed to: مساعدي
Item: 4	**need someone** to reposition me	**لمساعده شخص اخر** Back translated to: *"need the help of someone"*	Vocabulary Equivalence	Retained
Item: 5	**keep my muscles exercised**	**اداء تمارين رياضية لعضلاتي** Back translated to: *"perform athletic exercises to my muscles"*	Vocabulary Equivalence	Change to: إبقاء عضلاتي ممرنة
Item: 14	**prescription medication**	**الأدوية** Back translated to: *"medication"*	Experiential Equivalence	Changed to: الأدوية الموصوفة
Item: 23	feel **powerless**	**بالضعف** Back translated to: *"weak"*	Vocabulary Equivalence	Changed to: بانعدام القوة
Item: 30	use **over-the-counter medication**	**أتناول بعض الأدوية بدون وصفة طبية** Back translated to: *"use medication without prescription"*	Experiential & Idiomatic Equivalence	Changed to: أتناول أدوية لا تحتاج إلى وصفة طبية
Item: 35	ability to **exercise**	**تمارين رياضية** Back translated to: *"athletic exercises"*	Vocabulary Equivalence	Changed to: أداء التمارين

***** The process of translation and cross-cultural adaptation followed recommendations from the expert committee members producing the pre-final Patient Reported Impact of Spasticity Measure–Arabic (PRISM-Arabic). Words in **Bold** font is those of interest in the adaptation process. Words and sentences in *italic* style are the resulted backward translation from the forward translation synthesized version of the PRISM.

Results

Translation and Adaptation Process: The two forward translations in stage one (T1 and T2) had noteworthy differences between them. In fact, the title of the tool (Patient Reported Impact of Spasticity Measure) was significantly different after translating it to Arabic language. The term "spasticity" has no Arabic equivalent, and both translators had to describe the phenomenon to make it meaningful for readers. They produced one synthesized Arabic version of the PRISM (T3) from their individual translations. The two back translations in stage three failed to make sense in multiple occasions due to literal translation from the synthesized Arabic version of the PRISM to English language. The two produced English versions (T4 and T5) did not convey the content of the original PRISM in numerous items. After reviewing all versions throughout the translation process, the expert committee changed the language of some of the contexts in 14 occasions used in T3. Table 1 explains the translation process followed on all major contexts and items in the pre-final PRISM-Arabic that were deemed unclear.

Results from the Pilot Study

Using descriptive analyses, the means and standard deviations of the demographic variables were calculated (Table 2). Eight (22%) out of the 35 participants in this study reported difficulty in understanding 10 items from the questionnaire. Independent sample *t*-tests between the demographic groups showed that participants with lower level of education (high school and below) reported larger number of misunderstood items (19 items) compared to those with university level education and above (6 items) (P = 0.02). Also, there was a significant difference between those who were employed (18 items) and those who were not (11 items) (P = 0.03). (Table 3).

Adaptations After the Pilot Testing of the Pre-Final Version of the PRISM-Arabic

Four items out of all the 41-item pre-final PRISM-Arabic were most frequently thought to be unclear by participants (Table 4). Item number 5 "Helped me keep my muscles exercised" was reported by six participants to be unclear or difficult to understand because of a translation vocational equivalence issue. The word *exercised* (**ممرنة**) was perceived by these participants as the word *trained* or *under training task*. Consequently, the Arabic-translated word of "exercised" was re-adapted by expressing the conceptual meaning with more words. The resulted re-adaptation was (**ساعدتني في الحفاظ على نشاط وقوة عضلاتي**), which means "Help me keep my muscles in an exercised manner".

Table 2 Demographic and Spinal Cord Injury-Related Characteristics on the pilot group [*n* , (%)], N=35

Age (mean ± *SD*)	30.8 ± 8.8
Gender	
Male	27 (77.1%)
Female	8 (22.9%)
No. of Years Injured (mean ± *SD*)	4.9 ± 3.6
Level of Injury	
Quadriplegic	9 (25.7%)
Paraplegic	26 (74.3%)
ASIA Classification	
A	14 (40%)
B	10 (28.6%)
C	9 (25.7%)
D	2 (5.7%)
Employment Status	
Employed	18 (51.4%)
Unemployed	11 (48.6%)
Marital Status	
Single	20 (57.1%)
Married	11 (31.4%)
Separated	3 (8.6%)
Widowed	1 (2.9%)
Education Completed	
High School and Below	19 (54.4%)
University and Higher Education	16 (45.8%)

n: Sample size, *SD*: Standard Deviation values

Table 3 Demographic Groups' Differences on the Number of Misunderstood Items Reported*

Groups	*Mean*	*SD*	*p*
Educational Level			
Highschool and below	1.25	2.22	0.02*
University or higher education	0	0	
Employment Status			
Employed	0.06	0.24	0.03†
Unemployed	1.41	2.37	
Level of Injury			
Quadriplegic	1	2	0.58
Paraplegic	0.62	1.7	
Type of Injury			
Complete Injury	1.36	2.59	0.16
Incomplete Injury	0.3	0.73	

*This table represents the differences between groups within a demographical category. Means differences were analyzed using independent sample t-tests. † Significant difference ($p < .05$)

Also, item number 14 "Caused me to increase the amount of prescription medication I took", and item number 30 "Caused me to use over-the-counter medication", both were reported difficult by three and four participants, respectively. This difficulty was because of the relationship between the two items that resulted in a translation experiential equivalence issue. Participants reported that they cannot distinguish between the two items and that the medication prescription process was never experienced the same way that the questionnaire is describing, because medication in Saudi Arabia usually can only be obtained from pharmacists with a prescription given by their physicians. Therefore, item 14 was re-adapted to (**جعلني أقوم بزيادة جرعة الدواء المسجل بالوصفة الطبية**), which means "Caused me to increase the amount of medication listed in the prescription".

Lastly, item number 38 "Made transfers hard for me or my attendant" that was translated in Arabic into " **جعلت الانتقال صعبا**" was reported by four participants to be unclear or vague because of a translation vocabulary issue. The word *transfers* "**الانتقال**" is a vague and an indefinite word. Therefore, we added a few words "transfers from chair" to give an indication to the actual physical function of making transfers. The resulted re-adaptation was "**جعل الانتقال من الكرسي صعباً**", which means "Made transferring from chair hard".

Face and Content Validity of the PRISM-Arabic: All 35 participants reported that the PRISM-Arabic items were relevant and appropriate to their experience with spasticity, thus supporting the face validity of the cross-culturally adapted PRISM. Also, all expert committee members reached a consensus concerning the relevance and appropriateness of the PRISM-Arabic to those Arabic speaking individuals with SCI affected by spasticity. Furthermore, the completeness of the PRISM-Arabic items was satisfactory and the absence of floor and ceiling effects in the analysis further support adequate content validity (see appendix C).[30]

Table 4: Results from Pilot Testing Pre-Final Version of the PRISM-Arabic and Related Adaptation*

Item	Context from the original PRISM	No. of participants who reported unclear	Context from the pre-final version of the PRISM-Arabic and related issue of translational equivalence	Solution	Resulted change
5	Helped me keep my muscles **exercised**	6	ساعدتني على إبقاء عضلاتي **ممرنه** Perceived as **trained** *Issue of vocabulary equivalence*	Added group of words	ساعدتني في الحفاظ **على نشاط وقوة عضلاتي**
14	Caused me to increase the amount of **prescription medication** I took	3	**تسبب في زيادة كمية الأدوية الموصوفة التي أتناولها** Difficult to be distinguished from item 30 *Issue of experiential equivalence*	Rewording the whole sentence	جعلني أقوم بزيادة جرعة الدواء المسجل بالوصفة الطبية
30	Caused me to use **over-the-counter medications**	4	جعلني أتناول أدوية لا تحتاج إلى وصفة طبية Difficulty to be distinguished from item 14 *Issue of experiential equivalence*	Rewording item 14 to clarify the differences between item 30 and item 14	No Change
38	Made **transfers** hard for me or my attendant	4	جعلت **الانتقال** صعبا عليّ أو على مساعدي The word **transfer** alone in Arabic is broad and diffused *Issue of vocabulary equivalence*	Added **"from/to chair"** to refer to the actual transfer function	جعل الانتقال **من/إلى الكرسي** صعباً عليّ أو على مساعدي

*Frequencies of items that were sought to be unclear by participants, and how they have been linguistically and culturally adapted into Arabic language. Words in **bold** style font are of interest in the translation and adaptation process. Words in *italic* style font are issues of translational equivalence

Discussion

The purpose of the study was to translate and cross-culturally adapt the PRISM questionnaire into Arabic language and pilot test the PRISM-Arabic with individuals with SCI who complain of spasticity. The study followed the guidelines for cross-cultural adaptation for self-reported measures given by Beaton et al.[29] The resulted translation had some minor changes that were proposed by the participating expert committee members. Although the expert committee handled the linguistic, cultural, and technical issues prior to the pre-final administration stage, the process of pilot-testing the pre-final Arabic PRISM was essential in identifying further issues that could not be explored within the previous stages. Thirty-five participants with SCI reporting spasticity in the cross-cultural adaptation process helped recognize, analyze, and re-adapt four items of the pre-final PRISM-Arabic after the pilot study.

Lack of clarification and ambiguity of the written language can negatively influence the performance of the translated questionnaire and thus jeopardize the original intent. The pilot study analysis revealed significantly more reported misunderstood items in participants with lower education. This finding may suggest that the pre-final PRISM-Arabic was written at a too high of a level for persons with less education. The noted items with difficulties were re-adapted further to simplify them more by using additional words to explain them better. The pilot study also revealed significantly more reported unclear items with those who were unemployed. This may suggest the experiential factor affecting the clarity of some items. Thus, items with experiential issues were re-adapted to fit the target population's cultural differences. In general, this exploration analysis helped in modifying the pre-final PRISM-Arabic to minimize confusion, facilitate better understanding of the items, ensure clarity, and thus maintain and reflect the integrity and purpose of the original PRISM.

The translation and cross-culture adaptation process followed in the PRISM-Arabic in our study has thoroughly implemented the Beaton[29] guidelines involving all stages. The reported Serbian version[22] had no expert panel involvement, while in our study, the expert committee played an integral part in the adaptation process. Further psychometric properties comparisons may be studied between the two versions (Arabic and Serbian) along with the original PRISM.

The study also examined the PRISM-Arabic's face and content validity. After changes were made, the PRISM-Arabic was finalized and ready to be tested in a larger scale for psychometric properties including the evaluation of test-retest reliability, construct validity, internal consistency, and sensitivity to change to support the utility of the PRISM-Arabic in spasticity-related care.

Implications for Rehabilitation and Research

Due to the high incidence of SCI in Saudi Arabia and the lack of a self-reported spasticity assessment tool in dealing with such a complication, the cross-cultural adaptation of the PRISM supports the use of standardized assessments. The use of standardized assessments can improve spasticity management practice, help identify patient's needs and serve as a basis for treatment planning. Furthermore, active participation of the patient in his/her own examination and evaluation will also be facilitated in such standardized assessment approach.

To the author's knowledge, the introduction of a spasticity-specific self-reported outcome measure such as the PRISM into clinics in Saudi Arabia will be the first of its kind. The use of the PRISM-Arabic will introduce and support a new area of research and clinical assessment related to patients with SCI reporting spasticity.

Limitations

Although participating hospitals in this study received patients with SCI from all over the country, the limited data collection to one geographical area within Saudi Arabia may threaten its generalizability. Also, although the translation process adopted the MSA language, it should not be broadly assumed that all Arabic speakers would respond to the PRISM-Arabic consistently. Future studies should examine its usability and applicability in other Arabic-speaking countries.

Conclusion

The PRISM was successfully translated and cross-culturally adapted into Arabic language for Arabic speakers with SCI reporting spasticity. Further testing of the PRISM-Arabic's psychometric properties is a necessary next step in future studies to strengthen its utility in spasticity-related care.

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