

Portuguese version of the standardized Nordic musculoskeletal questionnaire: cross cultural and reliability

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Abstract

Background The self-administered questionnaires are fundamental for clinical assessment and research. The accessibility and constant use of recognized questionnaires in different languages facilitates the compilation of reliable data in international multicentre studies.

Aim The purpose of this study was to carry out a cross-cultural adaptation of the standardized Nordic musculoskeletal questionnaire for Portuguese workers and to investigate the psychometric properties of the Portuguese version.

Methods Sixty warehouse workers completed the questionnaire booklet containing the newly translated version of the standardized Nordic musculoskeletal questionnaire (NMQ) and the Oswestry disability index (ODI). After a week, to test reliability, all the individuals completed the

standardized Nordic musculoskeletal questionnaire for a second time. The study is in accordance with the ERGHO guidelines for cross cultural adaptation.

Results The Kendall's tau-b correlation coefficient demonstrated existence of association to the upper back region variable "last 7 days" (0.350 to $p < 0.01$), low back region variable "last 7 days" (0.290 to $p < 0.05$), and low back region variable "limitations in daily activities" (0.479 to $p < 0.01$). These results showed a moderate correlation between the NMQ and ODI. Through the Kappa agreement correlation coefficient, we observe that the majority of the correlation coefficients were between 0.8 and 1, showing the existence of a strong to a very strong association, indicative of good levels for test-retest reliability. The Kuder-Richarson coefficient of reliability showed a correlation coefficient of 0.855 indicative of good internal consistency.

Conclusion The Portuguese version of the standardized Nordic musculoskeletal questionnaire for Portuguese workers seems to be valid revealing good coefficients of reliability.

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Keywords Cross cultural adaptation · Reliability · Validity · Musculoskeletal symptomatology

Introduction

The European Foundation for the Improvement of Living and Working Conditions (2007) points out that Portugal is the third country in the European Union that provides disability to workers with musculoskeletal lesions. The musculoskeletal symptomatology can be related to individual characteristics such as age (Morken et al. 2002); however,

several studies have revealed a narrow correlation with working conditions. Often the workers are forced into repetitive movements and exposed to vibration (Cherry et al. 2001; Dovrat and Katz-Leurer 2007; Guo 2002), to lifting and transporting weight (Hoogendoorn et al. 2002; Tveito et al. 2004), to incorrect postures for long periods of time (Dovrat and Katz-Leurer 2007; Hoogendoorn et al. 2002; Jansen et al. 2004; Simoneau et al. 1996), to long working hours (Ala-Mursula et al. 2004; Dembe et al. 2005; Guo 2002; Häkkinen et al. 2001; Shimizu et al. 2004) and to the use of inadequate equipment (Chyuan et al. 2004; Häkkinen et al. 2001; Jansen et al. 2004; Lemasters et al. 1998; Moraes et al. 2002; National Health Committee 2000). All these factors create tension in soft tissues progressively causing musculoskeletal complaints including pain (Jansen et al. 2004; Kuorinka et al. 1987; Pinheiro et al. 2002).

The self-administered questionnaires are essential for clinical assessment and research. The availability and consistent use of established questionnaires in different languages facilitates the collection of reliable data in international multicentre studies. After a systematic search, the only Portuguese version found was the standardized Nordic musculoskeletal questionnaire (Barros and Alexandre 2003). However, this version was for the Brazilian people; thus, there is no guarantee that any of the Portuguese versions currently in use demonstrate necessary equivalence to the original English version or even with each other.

The cultural and linguistic adaptation of an instrument previously developed and validated represents an easy alternative in the use and disclosure of measurement in health. Therefore, until a measuring instrument can be used in different cultures, it is necessary to ensure that the translations and the adaptations are equivalent (Ferreira 1996; Rosete and Ferreira 1996).

The consideration of two major goals is essential, the evaluation of the linguistic and conceptual equivalences and the evaluation of the psychometric properties. According to the European Group on Health Outcomes (ERGO), the previously mentioned equivalences refer to those which enable us to consider whether a certain instrument of measurement has a cultural equivalency or not. Since the instrument of measurement at stake was already validated, the content criterion and technical equivalences have already been approached (Ferreira 1996; Rosete and Ferreira 1996). However, measurement had been discussed as a research tool and many specialists are concerned with the judging of their quality measures in terms of validity and reliability (Medical Outcomes Trust 1997). The validity can be defined as the extent to which any measuring instrument measures what it is intended to measure and the reliability refers to the consistency and dependability of the measure (Carmines and Zeller 1991). The aims of this study were to carry out a cross-cultural adaptation of the

standardized Nordic musculoskeletal questionnaire (NMQ) for Portuguese workers and to investigate the psychometric properties of the Portuguese version.

Methods

Subjects

Sixty warehouse workers of a business group of food distribution participated in this study. The mean age was 34.6 ± 8.49 , the youngest 20 and the oldest 49. All the individuals carried out similar tasks under controlled temperature conditions (0–5°C). In addition, the company rules demand the use of protection against the cold (gloves, boots, special customs and back belts). Of the male workers who agreed to participate, the sample excluded those presenting recent musculoskeletal symptomatology and those that had already gone through the medical consultation for treatment (Kuorinka et al. 1987).

The same group filled in the previously mentioned questionnaire again 1 week later. The questionnaire was individually self-administered in order to avoid any risks of contamination. All the participants were informed about the aim of the study and they all gave their consent according to the Helsinki Declaration.

Instruments

The NMQ consists of 27 binary choice questions (yes or no). The questionnaire has three questions correlating to nine anatomic regions (neck, shoulders, wrists/hands, upper back, low back, hips/thighs, knees, ankles/feet). The first is “had some troubles or pain in the last 12 months”, the second is “in the last 12 months felt some limitation caused by work in the daily activities”, and the third is “had some troubles or pain in the last 7 days”. According to the original author of the questionnaire, for “troubles” we must understand pain, discomfort or aching (Kuorinka et al. 1987). In the sense of facilitating the identification of the corporal areas, the questionnaire also includes a corporal diagram detaching all of the involved corporal areas (Kuorinka et al. 1987). In order to classify the pain in the “last 7 days”, we included the numeric pain scale (Jensen and Karoly 2001; Miguel 2003) in this new version of the questionnaire.

Conceptual equivalence and linguistic or semantic equivalence

The process of the conceptual and linguistic equivalences began with the translation using official translators. When these versions were available, a consensus meeting was

held to discuss and evaluate the first translation efforts. The objectives were to ensure that the target version was equivalent to the original version, conceptually and linguistically. Later, a back-up translation was made to detect errors of meaning and concept nonequivalence.

After the conclusion of both translations, a reconciliation meeting was conducted to obtain a consensus version. The members of the panel consisted of two ordinary people (one administrative and one from the cleaning staff), two specialized physiotherapists and two bilingual and independent translators (Medical Outcomes Trust 1997; Ferreira 1996; Rosete and Ferreira 1996). To test this version, a pilot study was made with a pre-test with 10 selected individuals (workers in the Health School).

Validity

Validity is divided in three types: the content validity, the criterion validity and the construct validity. Essentially, content validity depends on the extent to which an empirical measure reflects a specific domain of content. Criterion validity could be assessed by correlating a measure and the criterion at the same point in time. Construct validity is the ability of an instrument to reflect the construct and is usually tested through exploratory factor analysis (Carmines and Zeller 1991; Ferreira 1996; Rosete and Ferreira 1996).

Reliability

Reliability was assessed through internal consistency and test-retest reliability (Carmines and Zeller 1991; Ferreira 1996; Rosete and Ferreira 1996). Internal consistency evaluates the extent to which items, comprising a scale, measure the same construct. Test-retest reliability is the ability of an instrument to produce similar results on repeated administration when, no real change in health status has occurred within this period (Carmines and Zeller 1991; Medical Outcomes Trust 1997; Ferreira 1996; Rosete and Ferreira 1996).

Statistical

Descriptive techniques were used to analyse and characterize the subjects. The criterion validity was tested through the Kendall's tau-b correlation coefficient. The internal consistency was tested through the Kuder-Richardson formula (KR20); the test-retest reliability was assessed with the Kappa agreement correlation coefficient. All statistical analyses were performed using SPSS Statistical Software (SPSS 17.0 for Windows) and the STATA (Data Analysis and Statistical Software) with a 5% significance level.

Results

The results showed that the majority of the workers had no pain or discomfort in the nine regions of the body, especially during the last 12 months. In the regions elbows, hips/thighs, none of them refer pain or discomfort, just in the regions shoulders, wrists/hands, knees, ankles/feet (four workers) refer pain or discomfort giving problems in daily living; they also refer some problem in the last 7 days. They classified their pain as mild.

On the other hand, 24 workers described the low back as the major region complain in all three variables and they classified their pain as moderate to severe interfering in their daily activities during for the last 12 months and persisting in the last 7 days. This fact (severe pain) only occurred in the low back and ankle/feet region; however, with much less proportion in the latter as we can see in Table 1.

According to Table 1, in the last 12 months, we can see that besides the low back region, the upper back (13 workers) also had pain or discomfort. Most of those problems interfered in their daily lives. The neck region (7 workers) also presented pain or discomfort in the last 12 months and about half the workers complained of that interfering in their daily lives. Nonetheless, the workers classified their pain in both regions as mild to moderate.

Validity

Following the translation into Portuguese and the subsequent retranslation to the original language of the NMQ, it was verified that there was no relevant change in the meaning of the items. Afterwards, the intelligibility comprehensibility and the writing of the scale were assessed focusing on the NMQ items that had been into Portuguese. In the end, a consensus about the translation of the NMQ was obtained and a definitive questionnaire was constructed.

The results of Kendall's tau-b correlation coefficient demonstrated the existence of correlation between the upper back region variable "last 7 days" (0.350 to $p < 0.01$), the low back region variable "last 7 days" (0.290 to $p < 0.05$), and the low back region variable "limitations in daily activities" (0.479 to $p < 0.01$). These results showed a positive correlation that was moderate and statistically significant between the Nordic musculoskeletal questionnaire and the Oswestry disability index.

Reliability

The NMQ test-retest reliability using the Kappa agreement correlation coefficient with an interval of 1 week showed values between 0.677 and 1. The variables with highest

Table 1 Percentage of complains in all regions

Location of the pain	Questions					
	Have you at any time during the last 12 months had trouble (such as aches, pain, discomfort, numbness)?		Have you at any time during the last 12 months been prevented from doing your daily activities (at home or away from home) because of the trouble?		Have you had trouble at any time during the last 7 days?	
	Yes	No	Yes	No	Yes	No
Neck	11.7%	88.3%	6.7%	93.3%	6.7%	93.3%
Shoulders	6.7%	93.3%	6.7%	93.3%	6.7%	93.3%
Elbows	0	100%	0	100%	0	100%
Wrists/hands	6.7%	93.3%	0	100%	6.7%	93.3%
Upper back	21.7%	78.3%	20%	80%	15%	85%
Low back	40%	60%	20%	80%	35%	65%
Hips/thighs	0	100%	0	100%	0	100%
Knees	6.7%	93.3%	6.7%	93.3%	6.7%	93.3%
Ankles/feet	6.7%	93.3%	6.7%	93.3%	6.7%	93.3%

correlation coefficient, 1, were shoulders, wrist/hands and knees (Table 2).

According to Table 2, it can be observed that the majority of the correlation coefficients (0.8–1) demonstrated the existence of a strong to very strong association indicative of good reliability levels test-retest. The results showed that in only one of the variables we verified a value considered medium (0.677).

For some variables, it was not possible to compute the test because all the individuals gave the same answer for the two applications of the questionnaire (“no pain or discomfort”); these occurred in the elbows and hips/thighs regions for all three variables (Table 2). The internal consistency has been verified by the Kuder-Richarson

coefficient of reliability, which showed a correlation coefficient of 0.855.

Discussion

The cultural and linguistic adaptations of the standardized Nordic musculoskeletal questionnaire (NMQ) to the Portuguese workers involve the translation from the original language to Portuguese and the psychometric properties analysis (validity and reliability). Those processes were achieved without difficulties and were carried out in accordance with the Medical Outcomes Trust (1997) procedures and ERGHO (Ferreira 1996; Rosete and

Table 2 The Kappa agreement correlation coefficient for each answer in the questionnaire

Location of the pain	Questions		
	Have you at any time during the last 12 months had trouble (such as aches, pain, discomfort, numbness)?	Have you at any time during the last 12 months been prevented from doing your daily activities (at home or away from home) because of the trouble?	Have you had trouble at any time during the last 7 days?
Neck	0.677	1	0.880
Shoulders	1	1	1
Elbows	– ^a	– ^a	– ^a
Wrists/hands	1	1	– ^a
Upper back	0.779	0.784	0.934
Low back	0.866	1	0.927
Hips/thighs	– ^a	– ^a	– ^a
Knees	1	1	– ^a
Ankles/feet	1	– ^a	– ^a

^a Could not be computed because all the variables were constant

Ferreira 1996). The content validity was obtained during the translation and retranslation process, which was referred to a panel of judges constituted by a multidisciplinary panel (ordinary people, bilingual official translator and physiotherapists). This panel checked the clearness the inclusion of all concepts and the redundancy of the instrument's items (Hutchinson et al. 1997; Meadows et al. 1997). The validity criterion of this version that has been tested with the Oswestry disability index showed a moderate and positive correlation when considering the upper back and low regions variable “last 7 days” and low back region variable “limitations in daily activities”. We could not find the same correlation with the other regions or variables due to the fact that the Oswestry disability index only measures the impact of disability of low back pain (Fairbanks et al. 1980), which limited our study. On the other hand, in our country, this instrument is the most similar tool to the NMQ that we have translated and validated.

The result of the test-retest showed an excellent level of reliability as per the high values of correlation obtained in the majority of variables (Table 2). Only one correlation coefficient was inferior to 0.7 and for the others it was always around 0.9 to 1. Our results are in accordance with the original version where variance was 0.8 to 1 (Kuorinka et al. 1987) and another one from Palmer et al. (1999). In a study about “...Reliability of a Self-Administered Musculoskeletal Symptoms...” they also determined Kappa coefficients with values of 1. The cross cultural adaptation and validation of NMQ to the Brazilian people also revealed very good results of reliability between 0.63 and 1 (Barros and Alexandre 2003). A recent investigation in Australia revealed values of $k/k_{max}=0.71-0.96$ and $k/k_{max}=0.76-1.00$ in groups in a study (Dawson et al. 2009).

As we can see in Table 2, 10 of the 27 NMQ variables could not be computed because the answers were equal at each application of the questionnaire for all individuals—everybody selected “No pain or discomfort in the last 12 months or 7 days” and kept their opinion during the study. Still, we thought that our results could have been inflated by the characteristics of our sample. In general, they were young adults showing very good results with no pain for most body regions, which contributed to the consistency of the answers. Another explanation for the consistency of the answers could be the fact that the questionnaire had binomial answers.

According to the results, the internal consistency of the Portuguese version of the NMQ indicated that the Kuder-Richarson coefficient of 0.855 was good (Carmines and Zeller 1991). We could not compare the results with other studies because in all that we find they did not revealed the internal consistency correlation coefficient.

Adding to all the information previously described, for the purpose of achieving a bigger and better representation

of the Portuguese population, we think this instrument of measure should be applied to subjects with different characteristics than those that participated in this study.

Conclusions

We believe that the Portuguese version of the standardized Nordic musculoskeletal questionnaire is functional and easily understood, showing good reliability and moderate validity.

Conflict of interest statement The authors disclose any relevant associations that might pose a conflict of interest.

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