Questionnaire of planned behavior in diabetes - foot care: validation

Lidiane Aparecida Monteiro[1], Érika de Cássia Lopes Chaves[1], Valéria Helena Salgado Souza[1], Denismar Alves Nogueira[1], Maria da Graça Pereira[2], Denise Hollanda Iunes[1]

1 Federal University of Alfenas
2 University of Minho

ABSTRACT

Aim: To carry out the cultural adaptation and evaluation of the psychometric properties of a Questionnaire on Planned Behavior in Diabetes - Foot Care. Methodology: This is a methodological study in which semantic analysis was carried out by a committee of judges; pre-test and subsequently test-retest; internal consistency analysis and exploratory factor analysis were carried out on a sample of 130 people with diabetes mellitus of a Family Health strategy. We instituted 6.35% of semantic change in the original scale. **Results:** The questionnaire remained stable ($p > 0.05$ for most items, CHF = 0.675); good internal consistency (Cronbach's alpha:> 0.7 in the four areas), great relationship between the domains (KMO = 0.741) and stability in the factorial structure. **Conclusion:** The instrument proved to be suitable for replication in a Brazilian scenario.

Descriptors: Diabetes Mellitus; Diabetic Foot; Health Education; Nursing.

INTRODUCTION

"Diabetic Foot" is the term used to describe one of the most important complications affecting people with diabetes mellitus, that is, the plantar lesions, which in turn can be aggravated by infections, neurological or vascular disorders and/or metabolic complications[1]. Such lesions are associated with a high number of cases of lower limb amputation and even the death of diabetic patients who do not adhere to self-care behaviors[2].

It is therefore necessary to know the behavior of these people regarding foot care, in order to draw up educational strategies aimed at stimulating the development of a pro-active attitude toward self-care and knowledge[3].

In this context, in order to identify health behaviors towards the feet, we have developed an instrument called "Questionnaire of Planned Behavior in Diabetes - Foot Care (QCP-CP)"[4], that was used with the 120 people suffering from diabetes mellitus type 2 who attended the Family Health Units and Health Centers of northern Portugal. The questionnaire has 22 different items, with answers in the style of Likert, related to washing and drying care, and daily observation of the feet. The items of the instrument are grouped into six areas: intentions, attitudes, subjective norms, perceived behavioral control, action planning and *coping* planning[4].

The domain *intentions* consists of two items; *attitudes* which includes five items; *subjective norms*, with three items and the domains *perceived behavioral control*, *action planning* and *coping planning* consisting of four items. Each domain presents scores with different values. Note that the domains *attitudes* and *subjective norms* have inverted scores[4].

The QCP-CP was based on the Theory of Planned Behaviour (TPB)[4], which was developed from the principles of reflected action and was added to the concept of behavioral control understanding. The TPB states that the intention behind a behavior is crucial to enable people to execute an activity, because it reflects the level of motivation and readiness for doing it. Such intentions involve the influence of three aspects: attitudes towards behavior; subjective norms, which refer to social influence; and perceived behavioral control, which indicates that the most suitable attitudes and subjective norms are those regarding behavior and, the greater the concept control, the more intense the purpose of the person involved in its implementation[5].

The QCP-CP is an instrument which assesses self-care of the feet implemented by people with diabetes mellitus, and it can be used by health professionals for a more effective approach in order to identify the gaps in knowledge and then employ the appropriate teaching methods to address the issue. However, to be used in Brazilian society, it needs to undergo a process of cultural adaptation and validation that can provide a behavior identification tool for people with diabetes with regard to foot care and hence allow researchers to use a reliable and precise scale to implement new studies in the country.

Thus, the aim of this study was to perform a cultural adaptation and evaluation of the psychometric properties of the QCP-CP.

METHOD

The research is methodological and followed the analytical steps of the semantic capacity of the questionnaire and the evaluation of the psychometric properties[6]. The analysis of the semantic capability is intended to verify

the equivalence of meanings of the words and expressions contained in the instruments[6].

As it is an instrument of Portuguese origin, there was no need for translation. However, to ensure proper understanding of the instrument, a panel of judges composed of two researchers of diabetes mellitus was created: a professional with experience in instrument validation, a nurse who assists individuals suffering from diabetes, and a person diagnosed with type 2 diabetes mellitus.

The judges were approached individually and asked to analyze the degree of difficulty in understanding the instrument, the meaning of each item, the structure and understanding of the answers, as well as the adequacy of the instrument's instructions and title. This semantic validation stage allowed the researchers to verify whether all instrument items were understandable and assured the equivalence of the two versions.

To analyze the semantics, the instrument was subjected to a pre-test, that is to say, it was interpreted by a group of five people with type 2 diabetes mellitus, with the same education level, registered in a unit of the Family Health Strategy (FHS) of a city in the south of Minas Gerais. Thus, it was possible to examine whether the instrument items were understandable to all persons or if they were in need of some semantic adaptation in order to obtain a satisfactory version[6].

In order to analyze the psychometric properties of the instrument, the test-retest was first performed with a sample of 20 people with type 2 diabetes, registered in the same unit, at an interval of 15 days between application/reapplication by the same examiner, in order to assess the intra-examiner reliability of the QCP-CP. For analysis of this stage we used the Wilcoxon test, as it compares whether the position measurements of the test and retest

group are equal[7]. To determine the intra-rater reliability, the intraclass correlation coefficient was used, since it is used to measure the homogeneity of two or more measures. The reference values for ICC adopted were: lower than 0.40 indicates low correlation; between 0.40 and 0.60, moderate correlation; between 0.60 and 0.80, good or substantial correlation; higher than 0.80, almost perfect or very good[8].

The internal consistency analysis was assessed by Cronbach's Alpha index, with the total number of items and domains. Cronbach's Alpha checks whether the items of a scale are related to each other[9].

At the end, the instrument was administered to a group of 110 people with type 2 diabetes mellitus registered in the same unit of FHS. It is noteworthy that, for the validation of the questionnaire, literature recommendations were respected[10]. Regarding the number of participants, we considered five subjects per item of the instrument.

The validity of the Portuguese version of the QCP-CP was evaluated by means of the exploratory factorial analysis, varimax rotation. Thus, we applied Kaiser-Meyer-Olkin (KMO), which indicates whether sufficient elements are provided for each domain, and Bartlett's test, investigating the homogeneity of variances[11]. A varimax rotation is aimed at identifying the functional constitutive units of the test and the contribution of each to the overall results or to determine whether utterances of a scale regrouped around a single factor[12].

As eligibility criteria for the selection of the sample, we considered individuals aged 18 years or above who have been diagnosed with type 2 diabetes mellitus for more than five years - the longer the time of diagnosis of the disease, the higher the risk of developing complications resulting from diabetic foot.

To characterize the sample we investigated the variables age, gender, educational level, income and time of diagnosis of *diabetes mellitus* type 2.

We used the software *Statical Package for Social Sciences* (SPSS) version 21.0 for analysis of all study variables.

The study was evaluated and approved by a Research Ethics Committee through the Platform Brazil, under CAAE number 25025013.0.0000.5142. Because of the attention given to participants, permission to develop the study was asked of the institution. Respondents were asked to agree by signing Informed Consent, which guaranteed anonymity and the right to withdraw at any stage of the research. In addition, we obtained the permission of the author of the QCP-CP for adaptation and validation in Brazil.

RESULTS

In the process of semantic analysis of the QCP-CP few modifications were made (only 6.35% of the total items), so that we could achieve equivalence with the original version (Figure 1); the same occurred in the entire instrument, from the title "Questionnaire of Planned Behavior in Diabetes – Foot Care (QCP-CP)" to the statements, items and their answers. Changes were made in all the words that are influ enced by the Portuguese language as "objectivo" (objective), "subjectivo" (subjective), "controlo" (control) and "planeado" (planned) which have been modified to "objetivo" (objective), "subjetivo" (subjective), "controle" (control) and "planejado" (planned). In relation to the instrument appearance, the requested changes were the removal of commas in sentences and the lines between the answers of the questions in the fourth instrument of the domain.

Figure 1 - Items changed in the semantic analysis stage. Minas Gerais, 2014**.**

SEMANTIC ANALYSIS	
ORIGINAL PORTUGUESE VERSION	BRAZILIAN VERSION
1st Domain	
Eu tenciono lavar, secar bem e observar os pés, todos os dias. (I intend to wash, dry well and watch my feet every day.)	Eu tenho a intenção de lavar, secar bem e observar os pés todos os dias. (I intend to wash, dry well and watch my feet every day).
2nd Domain	
"Lavar, secar bem e observar os pés todos os dias é (coloque um círculo no número que melhor descreve a sua opinião) (I intend to wash, dry well and watch my feet every day is number (circle the number that best describes your opinion))"	"Lavar, secar bem e observar os pés todos os dias é (coloque um círculo na resposta que melhor descreve a sua opinião) (I intend to wash, dry well and watch my feet every day is number (circle the answer that best describes your opinion))"
"Muito bom / Bom / Nem bom nem mau / Mau / Muito mau (Very Good / Good / Neither good nor bad / Bad / Very bad)"	"Muito bom / Bom / Nem bom nem ruim / Ruim / Muito ruim (Very Good / Good / Neither good nor bad / Bad / Very bad) "
"Muito Cômodo / Cômodo / Nem cômodo nem incômodo / Incômodo / Muito incômodo (Very Comfortable / Comfortable / Not comfortable or uncomfortable / uncomfortable / Very uncomfortable)"	"Muito agradável / Agradável / Nem agradável nem desagradável / Desagradável / Muito desagradável (Very pleasant / pleasant / not pleasant nor unpleasant / Unpleasant / Very unpleasant)"
"Muito saudável / Saudável / Nem saudável nem perigoso / Perigoso / Muito perigoso (Very healthy / Healthy / Not healthy or dangerous / dangerous / very dangerous)"	"Muito saudável / Saudável / Nem saudável nem maléfico / Maléfico / Muito maléfico (Very healthy / Healthy / Neither healthy nor harmful / harmful / very harmful)"

"Muito importante / Importante / Nem importante nem indiferente / Indiferente / Muito indiferente (Very important / important / not important or indifferent / indifferent / very indiferent)"	"Muito importante / Importante / Nem importante nem insignificante / Insignificante / Muito insignificante (Very important / important / not important or insignificant / Insignificant / very insignificant)"

3rd Domain	
"Devia / Talvez devesse / É-lhes indiferente / Talvez não devesse / Não devia (Should / Perhaps you should / it is irrelevant to them / Perhaps you should not / should not)"	"Devia / Talvez devesse / É indiferente / Talvez não devesse / Não devia (Should / Perhaps you should / it is irrelevant / Perhaps you should not / should not)"

4th Domain	
"Quanto controlo acredita ter sobre lavar, secar bem e observar os pés, todos os dias? (How much control do you believe you have over washing, drying well and watching your feet every day?)"	"Quanto controle acredita ter sobre lavar, secar bem e observar os pés todos os dias? (How much control do you believe you have over washing, drying well and watching your feet every day?)"
"Nenhum controle / Algum controle / Controle moderado / Muito controle / Completo controle (No control / Some control / Moderate control / Much Control / Full Control)"	"Nenhum controle / Algum controle / Controle moderado / Muito controle / Controle completo (No control / Some control / Moderate control / Much Control / Full Control)"

5th Domain	
"Em que altura do dia vou lavar, secar bem e observar os pés (At what time of day will I wash, dry well and observe the feet)"	"Em que momento do dia vou lavar, secar bem e observar os pés (At what moment of the day will I wash, dry well and observe the feet)"

Source: From the author

When performing reliability analysis, there were no significant differences between the first and second collection for 16 of the 22 items of the questionnaire; only six items (27.27%) showed significant values ($p<0.05$). The intra-rater reliability analysis of the total score obtained by the intraclass correlation index was ICC=0.675.

In the internal consistency analysis, the Global *Cronbach's Alpha* of 0.675 was found. The results for each factor are shown in Figure 2.

Figure 2 - Cronbach's alpha factors of the Planned Behavior Questionnaire on Diabetes - PBQ-CP. Minas Gerais, 2014.

FATORES	NÚMERO DE ITENS	ALFA DE CRONBACH
Intentions	2	0,949
Attitudes	5	0,785
Subjective norms	3	0,658
Perceived behavioral control	4	0,709
Action planning	4	0,799
coping Planning	4	0,622

Source: From the author

The validation of the instrument was conducted with 110 subjects aged 37 to 91 years, mean age of 62,95. The average diagnosis time according to the number of years of the disease was approximately 12.3 years. In relation to gender, it was observed that females (65.5%) were predominant in the sample. We also realized that the majority had low level of education, as 33.6% had never attended school and 36.4% had only incomplete elementary schooling, totaling 70% of individuals. Family income for 64.5% of the individuals ranged between two and three times the minimum wage.

With regard to the analysis of the psychometric properties, the Kaiser-Meyer-Olkin (KMO) achieved a good result (KMO=0.741). In the factor analysis using varimax rotation we were able to observe resemblance to the original instrument in five domains. Only domain 6 presented oscillation in matters 6a, 6c and 6d, which approached the fifth domain in factor 1 (Figure 3).

Figure 3 - Factorial loading of the questionnaire of planned behavior - Foot Care (QCP-CP). Minas Gerais, 2014.

QUESTIONS OF QCP-CP	DOMAINS					
	1	2	3	4	5	6
QCP- CP6d	0,826					
QCP- CP 6c	0,768					
QCP- CP 5c	0,693					
QCP- CP 6a	0,644					
QCP- CP 5b	0,635					
QCP- CP 5a	0,633					
QCP- CP5d	0,613					
QCP- CP 2a		0,82				
QCP- CP 2b		0,813				
QCP- CP 2e		0,791				
QCP- CP2d		0,695				
QCP- CP 2c		0,604				
QCP- CP 4b			0,78			
QCP- CP4d			0,724			
QCP- CP 4a			0,685			
QCP- CP 4c			0,59			
QCP- CP 1b				0,894		
QCP- CP 1a				0,894		
QCP- CP 3c					0,784	
QCP- CP 3b					0,779	
QCP- CP 3a					0,689	
QCP- CP 6b						0,766

Source: From the author

DISCUSSION

Currently, a large number of scales and evaluation questionnaires that measure a wide variety of health problems or of specific issues that are restricted to a specific disease or treatment are available. However, not all instruments are available in all countries and languages. Therefore the construction or cultural adaptation and validation[13] becomes necessary. For the present study we chose the validation method, not the construction method. The validation method is considered convenient since it allows shorter study time, low financial cost, data comparison between countries and implementation of multicultural studies[14].

Different cultures have differences in their habits and activities and they should be taken into account so that the adapted version does not become different to the original[6]. Thus, it is possible to infer that the original instrument was clear regarding terms, expressions and appearance, which facilitated its adaptation and allowed a few changes (basically grammatical and vocabulary corrections) to improve understandability, targeting the Brazilian cultural context and the concept measured by the instrument.

Regarding the process of cultural adaptation, the pre-testing of the instrument was carried out on five people diagnosed with type 2 diabetes mellitus for more than five years at the same level of education. Thus, it was possible to identify that the instrument was clear and understandable, and was accepted by the population under study. The completion of the pre-test is of the utmost importance to the cross-cultural adaptation and validation studies as the time when the population of interest to the study comes into contact with the questions, allowing the researcher to verify whether the scale of the translation is understandable and interpreted correctly, allowing adjustments and early detection of inconsistencies in the instrument[15].

In this study, it was revealed that the outcome of the analysis of the test-retest indicated that there was no difference between the first and second collection, which demonstrated efficacy in the questionnaire stability over time when applied at two different times[16]. In determining the intra-rater reliability, the results also show a good or substantial correlation, indicating a satisfactory similarity[8].

By analyzing the global internal consistency of the instrument and the domains *coping planning* and *subjective norms*, it was noted that the result was close to that recommended by the literature - Cronbach's Alpha between 0.7

Monteiro LA, Chaves ECL, Souza VHS, Nogueira DA, Pereira MG, Iunes DH. Questionnaire of Planned Behavior in Diabetes - Foot Care: Validation. Online braz j nurs [internet] 2015 Mar [cited year month day]; 14 (3):255-62. Available from: http://www.objnursing.uff.br/index.php/nursing/article/view/5159

and 0.9[17]. The other domains (*intentions*, *attitudes*, *perceived behavioral control* and *action planning*) showed excellent values[17], which favors the reliability of the measure, since the questionnaire is revealed as satisfactory due to the presentation of three areas with this feature [18]. Although the outcome of the internal consistency of the original QCP-CP[4], held in Portugal, has demonstrated the value of Cronbach's Alpha for domains higher than those found in this study (*intentions* (0.98), *attitudes* (0.85), *subjective norms* (0.71), *action planning* (0.97), *coping planning* (0.76) and *perceived behavioral control* (<0.70)), it is important to note that differences in the internal consistency of an instrument can be influenced by the social and cultural context of each country[19].

In this study we also conducted the exploratory factorial analysis of the QCP-CP. Their results show a good relationship between the domains and an adequate sample size for the stability of the factorial structure indicated by the KMO criteria, confirmed by the significance of Bartlett's Sphericity test and in line with the data found in the original study[4].

The analysis of content validity held in the present study found similar results to the original questionnaire[4] with respect to the saturation of the domains *action planning* and *coping planning*, however it differs in the remaining domains. These differences are influenced by the cultural differences of individuals investigated in each study[19].

On the question "b" of the sixth domain, it can be said that this question was isolated from the others perhaps by its own character, which is related to people who have plans to get help from others. From this perspective, the study reveals that people with diabetes do not want and do not intend to depend on others to perform health care[20].

CONCLUSION

Considering these results, we conclude that the Brazilian version of the QCP-CP, called "Questionnaire of planned behavior in diabetes - foot care", proved to be adequate and reliable to be replicated nationwide, once the evaluation of the psychometric properties demonstrates that the questionnaire presented parameters of reliability and validity that match the original proposed version. However, we suggest further studies in other populations who receive care from other health services, so that the results can be generalized to the Brazilian population, especially with regard to the confirmation of the position of the domains and internal consistency, which were the limitations found in this investigation.

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