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Research Article

Psychometric Properties of the Malay Version of Diabetes Quality of Life Measure among People with Type 2 Diabetes Mellitus in Kelantan, Malaysia

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Abstract

Reliable and valid health psychology tools are important in measuring the quality of life among people with type 2 diabetes mellitus (T2DM). In this study, we aimed to investigate the validity and reliability of the Malay version Diabetes Quality of Life (DQoL-M) measure using Exploratory Factor Analysis (EFA) in people with T2DM. Participants were 276 people with T2DM (male 47%, female 53%) aged over 18 years. They were recruited through the Hospital Universiti Sains Malaysia, Malaysia. Health-related quality of life was assessed using the DQoL-M measure. The DQoL-M measure used in this study contains 33 self-report items with 14 items measuring satisfaction and 19 measuring impact. We assessed the DQOL-M for satisfaction (DQoL-M-Satisfaction) and impact (DQoL-M-Impact) subscales separately using EFA. All analyses were conducted using SPSS 20.0. From the EFA analysis, two factors were identified for each DQoL-M-Satisfaction and DQoL-M-Impact. The total variance explained in the EFA was 40.0% for DQoL-M-Satisfaction and 40.4% for DQoL-M-Impact. The total number of item retained in the EFA was 14 and 16 items for DQoL-M-Satisfaction and DQoL-M-Impact respectively. This shortened version of DQoL demonstrated a reliable and valid measure of measuring the health-related quality of life in terms of satisfaction and impact among people with T2DM in Kelantan, Malaysia.

Keywords: *Type 2 Diabetes Mellitus; Quality of Life; Satisfaction; Impact; Exploratory Factor Analysis*

Abbreviations

T2DM: Type 2 Diabetes Mellitus; QoL: Quality of Life; DQoL: Diabetes Quality of Life measure; DQoL-M: Malay Version of Diabetes Quality of Life Measure; EFA: Exploratory Factor Analysis

Introduction

The Diabetes Quality of Life measure (DQoL) was developed in the early 1980s and was intended to evaluate the relative burden of an intensive diabetes treatment regimen in a DCCT [1,2]. The DQoL measures the relative burden of diabetes treatment, with the goal of maintaining blood glucose levels as close as possible to those of people without diabetes. The items in this measure cover a series of issues directly relevant to diabetes and its treatment [1]. The DCCT Research Group contributed their expertise to the development of this measure, and the items were derived from the literature on psychosocial aspects of diabetes, as well as from input from patients and clinicians. Then, the DQoL was repeatedly reviewed by diabetologists, diabetes educators, nurses, and mental health professionals familiar with diabetes [2].

The DQoL has been widely used by researchers in the past ten years in assessing the QoL of people with T2DM [3-5]. Although the DQoL was developed in the United States, it has been widely used by researchers in different ethnic populations and different countries. For instance, the DQoL was used in a community-based study on the Korean Americans with T2DM [3]. It was translated and re-validated into different language versions and were employed in different countries, for example, Hong Kong - Chinese version [6], Taiwan - Chinese

version [7], Thailand - Thai version [8], Turkey -Turkish version [9] and Italy - Italian version [10]. Watkins and Connell reported that this measure tends to be more sensitive to diabetes-related lifestyle issues [11]. Besides, Jacobson., et al. proposed that the measure is acceptable, easy to use and that people with diabetes have little difficulty understanding the items [2].

Diabetes is a major progressive and life-threatening disease with many complications. It is likely that people with diabetes will experience lower levels of QoL as the disease progresses. This will affect their motivation in trying to maintain their health. Thus, it is important to assess the diabetes QoL among people with diabetes, especially with T2DM. However, an Instrument assessing the QoL of people with T2DM should be selected carefully based on its suitability to answer the research questions and lead to the outcome of interest in this study. In Malaysia, the Malay language is the main language spoken by the Malaysian. Thus, this study aimed to translate the DQoL into the Malay language for use in the Malay population and to examine the validity and reliability of the translated Malay version of DQoL (DQoL-M) among people diagnosed with T2DM in Kelantan, Malaysia.

Materials and Methods

Design, Participants and data collection

A cross-sectional research design was employed in this study. Research ethics approval from the Universiti Sains Malaysia Human Research Ethics Committee was granted before data collection was conducted. Participants were recruited via the Diabetes Health Clinic at the Universiti Sains Malaysia Hospital. Participants who were able to read and understand the Malay version of DQoL completed the questionnaire and returned it to the researcher. Participants took approximately 30 minutes to complete the questionnaire.

Diabetes quality of life measure

The DQoL section consists of 46 items divided into three subscales: patient satisfaction, diabetes impact, and diabetes-related worries, including anticipated effects of diabetes and social worries. Answers are given on a 5-point Likert scale rated from 1 (very satisfied, no impact, no worry) to 5 (very dissatisfied, very impacted, very worried). The mean scores for each subscale using this method are interpreted against a 5-point scale, where 1 is equivalent to the highest QoL and 5 is considered the poorest QoL. The DQoL questionnaire used in this study contains 35 self-report items with 15 items measuring satisfaction and 20 measuring impact. The 11 items that form the worry subscale were found to be not applicable for most of the participants with T2DM in this research. It is more suitable for people with T1DM [2]. The 11 items from the worry subscale were excluded from this study. The DCCT Research Group evaluated the DQoL measure, reporting high test-retest correlations in the 0.78 to 0.92 range in both adults and adolescents with diabetes [2].

The appropriateness of items on DQoL-M was considered by experts in the local culture. Based on this process, the satisfaction item-10 and impact item-10 were excluded from DQoL-M. These items are 'How satisfied are you with your sex life?' and 'How often does your diabetes interfere with your sex life?'. These items were considered to be inappropriate to be included in a self-administered questionnaire for the local population in Kelantan, who are mostly from a conservative Muslim background. Thus, they would feel uncomfortable answering these questions because they would be regarded as personal. In terms of language, most of the people in Kelantan speak fluently in "Bahasa Melayu" (Malay language). A majority of the people with T2DM who visit the Diabetes Clinic in HUSM do not have fluent knowledge of English. Therefore, the DQoL was translated into Malay, which is understood by the local people.

Translation of questionnaires

The DQoL was forward-translated from the original English versions into the Malay versions by the first author. Back-translation of the questionnaires was then carried out in order to uncover any discrepancies of meaning between the original English language versions and the Malay versions of the questionnaires [12]. Back-translation, the translated version was done by a bilingual teacher at the Universiti Sains Malaysia. Ambiguous items were identified and modified retaining the meaning consistent with the English version. The translated version DQoL-M was reviewed by a psychologist, two medical doctors, and a native Malay translator who were bilingual (Malay and English), to ensure they would be readily comprehended by the local population in Kelantan, Malaysia. Pre-testing of the questionnaire was carried out among ten people with T2DM for comprehension and understanding.

Data analysis

All statistical analyses were conducted using the computer packages SPSS 20.0. Exploratory Factor Analysis (EFA) was used to identify items that belong to a factor in a multifactor structure. The principal components extraction method was used to extract the factors and their associated items. Then, the factors were rotated with Varimax rotation. Items with factor loadings lower than or equal to 0.3 were excluded from consideration. Then, the factor structure was examined, and a suitable name for each factor was given based on its theoretical structure. The internal consistency reliability of each factor identified in EFA was assessed with Cronbach's alpha coefficient.

Results

Participants' characteristics

The participants were all Malay ethnic background. The gender of participants in this study included females (n = 147, 53%) and males (n = 129, 47%). The overall participants' age ranged from 30 to 70 years, with a mean age of 57.1 years (SD = 8.47). The time since participants were diagnosed with T2DM ranged from 1 to 38 years, with a mean of 10.4 years (SD = 7.53).

Diabetes quality of life (DQoL)-satisfaction

Table 1 presents the factor loadings for the 14 items in the DQoL satisfaction scale. It shows that the DQoL-satisfaction scale consists of two constructs Factor 1S (named as treatment, management, and burden to family) and Factor 2S (named as general life health).

Item		Factor loading	
		1	2
Factor 1S: Treatment, management, burden to family			
QS1	How satisfied are you with the amount of time it takes to manage your diabetes?	.65	
QS2	How satisfied are you with the amount of time you spend getting checkups?	.71	
QS3	How satisfied are you with the time it takes to determine your sugar level?	.65	
QS4	How satisfied are you with your current treatment?	.76	
QS5	How satisfied are you with the flexibility you have in your diet?	.57	
QS6	How satisfied are you with the burden your diabetes is placing on your family?	.52	
Factor 2S: General life health			
QS7	How satisfied are you with your knowledge about your diabetes?		.52
QS8	How satisfied are you with your sleep?		.51
QS9	How satisfied are you with your social relationships and friendships?		.60
QS11	How satisfied are you with your work, school, and household activities?		.70
QS12	How satisfied are you with the appearance of your body?		.63
QS13	How satisfied are you with the time you spend exercising?		.52
QS14	How satisfied are you with your leisure time?		.59
QS15	How satisfied are you with life in general?		.67
Cronbach's alpha, α		.71	.73
% of variance explained		22.10	17.90
% of cumulative variance explained		22.10	40.00

Table 1: *Results of exploratory factor analyses for DQoL-satisfaction scale.*

All the items show factor loadings above the lower cut-off value, .30 and total variance explained was 40.00%. The reliability test revealed that Cronbach's alpha was .71 and .73 for Factor 1S and Factor 2S respectively, which were considered acceptable.

Diabetes quality of life (DQoL)-impact

Table 2 presents the factor loadings for the 19 items in the DQoL-M-impact scale. It shows that the DQoL-M-impact scale consists of two constructs Factor 1I (named as general life health) and Factor 2I (self-efficacy).

Item		Factor loading	
		1	2
Factor 1I: General life health			
QI1	How often do you feel pain associated with the treatment for your diabetes?	.65	
QI2	How often are you embarrassed by having to deal with your diabetes in public?	.70	
QI3	How often do you have low blood sugar?	a	
QI4	How often do you feel physically ill?	.41	
QI5	How often does your diabetes interfere with your family life?	.59	
QI6	How often do you have a bad night's sleep?	.51	
QI7	How often do you find your diabetes limiting your social relationships and friendships?	.48	
QI8	How often do you feel good about yourself?	.48	
QI9	How often do you feel restricted by your diet?	.55	
QI16	How often do you tell others about your diabetes?	a	
QI17	How often have you been teased because you have diabetes?	.71	
QI18	How often do you feel that because of your diabetes you go to the bathroom more than others?	.41	
QI19	How often do you find that you eat something you shouldn't rather than tell someone that you have diabetes?	.49	
Q20	How often do you hide from others the fact that you are having an insulin reaction?	a	
Factor 2I: Self-efficacy			
QI11	How often does your diabetes keep you from driving a car or using a machine (e.g. a typewriter)?		.66
QI12	How often does your diabetes interfere with your exercising?		.73
QI13	How often do you miss work, school, or household duties because of your diabetes?		.73
QI14	How often do you find yourself explaining what it means to have diabetes?		.59
QI15	How often do you find that your diabetes interrupts your leisure-time activities?		.70
Cronbach's alpha, α		.78	.75
% of variance explained		21.70	18.70
% of cumulative variance explained		28.01	40.40

Table 2: *Results of exploratory factor analyses for DQoL-impact scale.*

Note: a = Items with factor loading < 0.30 were deleted from the analysis.
Then, the EFA was rerun and the final results are presented in this table.

All the items showed factor loadings above the lower cut-off value .30 (except for items QI3, QI16 and Q20) and total variance explained was 40.40%. The reliability test revealed that Cronbach's alpha was .78 and .75 for Factor 1I and Factor 2I respectively, which were considered acceptable.

Discussion

Study had suggested that people with diabetes experience a decrease in their QoL compared to healthy individuals [13]. Previous study also reported that QoL among people with diabetes is worse than people in the general population [14]. A number of studies have shown the association between diabetes and QoL [15-18]. Goldney., *et al*. reported that severe depression affected QoL in people with

diabetes [16]. They concluded that the direct effect of depression on QoL is greater than the direct effect of diabetes on QoL [16]. Brown., *et al.* found that only T2DM had a large negative effect on QoL, whereas having T1DM did not affect QoL [15]. Therefore, specific measure for diabetes QoL is important for clinicians and researchers to evaluate the well-being based on their level of QoL. In addition, appropriate psychological or educational treatment would be able to offer to people with T2DM and with low QoL.

The present study has tested the validity and reliability of the Malay version of DQoL. Based on previous validation study, Burroughs., *et al.* has tested the validity of the DQoL scale using principal components analysis in EFA [19]. Another study omitted items from satisfaction and impact to suit their study population, but without first checking the underlying dimensions of the scale [20]. Up to date, there is no published study examining the item loadings and the underlying dimensions of the DQoL subscales specifically for Malaysian Kelantanese population. In this research, 14 items measuring satisfaction and 16 items measuring impact were identified for the present study. This version was found to be more applicable, and the length of the questionnaire was reduced. The majority of the items were retained for the satisfaction and impact subscales in DQoL-M.

There were several limitations in the present study. Self-administered questionnaire in the form of the paper-based survey was used in the study. Self-report data is subject to response bias which may impact the accuracy of the responses from the participants. Furthermore, the participants involved in the present study were Malay. This is inevitable a convenience sample because Kelantan population are predominant by Malay ethnic background. Therefore, although the predominantly Malay sample in this study is representative of the population of Kelantan, it does not reflect the population of the whole of Malaysia, which also includes other major ethnic groups, such as Chinese and Indian. Thus, future research involving other ethnic groups could add more information in regard to the validity and reliability of the DQoL-M and the result will be more representative of the Malaysian population. However, this study added additional information about validity and reliability of DQoL-M on a specific subgroup of the Malaysian population. The Malay in Kelantan formed a distinct group in Malaysia and was reported to be genetically different from the other Malay sub-ethnic groups [21]. T2DM is common among Malay Kelantanese and hence this study has yielded important insight about the validity and reliability of DQoL-M among people with T2DM in Kelantan, Malaysia.

Conclusion

The final version for the subscales of satisfaction and impact consisted of 14 and 16 items respectively which reflect acceptable factor loading in EFA for the sample in this study. This shortened version of DQoL-M is a reliable and valid measure of health-related quality of life among people with T2DM in Malaysian-based sample specifically in Kelantan.

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Conflict of Interest

No potential financial interest or any conflict of interest reported by the authors.

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