Failure to replicate the internal structure of Greek-specific thalassemia quality of life instrument in adult thalassemia patients in Sabah

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Purpose: To study the validity and reliability of the Malay version of the Specific Thalassemia Quality of Life Instrument (STQOLI) in Sabah’s adult thalassemia patients.

Patients and methods: This cross-sectional study was done at Thalassemia Treatment Centre, Queen Elizabeth Hospital in Sabah, Malaysia. Eighty-two adult thalassemia patients who fulfilled the inclusion and exclusion criteria were conveniently selected for participation in the study. The English version of STQOLI was translated into Malay by using forward and back translations. The content of the questionnaire was validated by the chief hematologist of the hospital. The construct validity of the 40-item questionnaire was assessed by principal component analysis with varimax rotation and the scale reliability was assessed by Cronbach’s alpha.

Results: The study failed to replicate the internal structure of the Greek STQOLI. Instead, 12 factors have been identified from the exploratory factor analysis, which accounted for 72.2% of the variance. However, only eight factors were interpretable. The factors were iron chelation pump impact, transfusion impact, time spent on treatment and its impact on work and social life, sex life, side effects of treatment, cardiovascular problems, psychology, and iron chelation pill impact. The overall scale reliability was 0.913.

Conclusion: This study was unable to replicate the internal structure of the Greek STQOLI in Sabah’s adult thalassemia patients. Instead, a new structure has emerged that can be used as a guide to develop a questionnaire specific for adult thalassemia patients in Sabah. Future research should focus on the eight factors identified from this study.

Keywords: STQOLI, validity, reliability, Malay, transfusion

Introduction

Beta thalassemia, an inherited blood disorder, is most common in persons of Mediterranean, African, and Southeast Asian descent.1 In Malaysia, the prevalence of the heterozygous carriers for the disease is reported to be about 4.5%.2 The Malaysian Thalassemia Registry 2009 shows that one-fourth of the registered thalassemia patients are from the east Malaysia state of Sabah.3 And it was estimated that over 1,000 cases are transfusion-dependent beta thalassemia patients.4

Beta thalassemia is a serious life-limiting condition5 that not only affects patients’ physical functioning but also their emotional functioning, social functioning, and school functioning, leading to impaired health-related quality of life (HRQOL) of the patients.6 HRQOL is an important dimension of care7 and can be seen as a way for assessment of patients’ perspectives about their disease and related treatments, their perceived needs for health care and their preference for treatment and disease outcomes.8
The HRQOL should be considered as an important index of effective health care as it can give a more holistic view of well-being. However, there is very little published work on evaluation of HRQOL in thalassemia patients. It is believed that the HRQOL in thalassemia patients is lower than that of normal population because of a variety of issues like the presence of comorbid conditions, frequent hospital visits for transfusion, painful injections, appearance, absence of sexual development, infertility, inability to take care of their own family, disease complications, uncertainties about the future, psychiatric disorders, and difficulties in employment and playing a role in society.

A 36-Item Short Form Health Survey (SF-36) and its derivative were the most commonly used instrument to measure HRQOL in adult thalassemia patients. It may, however, be insensitive to the unique experience of thalassemia patients. In 2012, Specific Thalassemia Quality of Life Instrument (STQOLI) was developed and had been validated for use among the patients in Greece. So far, it is the only instrument that is tailored specifically for the adult thalassemia patients.

This study attempted to replicate the psychometric structure of the original STQOLI using the Malay version of the instrument.

**Material and methods**

**Participants and settings**

This cross-sectional study was conducted among adult beta thalassemia patients who received transfusion treatment at the Thalassemia Treatment Centre (TTC) in Queen Elizabeth Hospital from February to July 2015. Queen Elizabeth Hospital is a referral tertiary hospital located in Kota Kinabalu, the capital city of Sabah. The inclusion criteria were patients diagnosed with beta thalassemia and aged 18 years and above. The exclusion criteria were patients who do not understand Malay language or unwilling to participate in the study. The eligible patients were identified from the list of patients who received their transfusion treatment at the TTC. Eighty-two participants were conveniently selected during the transfusion day. The participants were justified as representative of all Sabah beta thalassemia patients as TTC caters not only for patients from Kota Kinabalu but also patients from other districts in Sabah. The study has been approved by Medical Research and Ethics Committee (MREC) of Malaysia.

**Study instrument**

In this study, HRQOL assessment was performed using the Malay version of STQOLI. A user agreement was signed with the copyright owner of the original STQOLI, Dr Georgios Lyrakos, from the Lyrakos G. Psychometrics and Research, Greece, prior to the use of the questionnaire.

The questionnaire consists of four domains: disease and symptoms (12 items), chelation therapy (13 items), psychosocial impact (10 items), and transfusion impact (5 items). The HRQOL was assessed by patient response in each domain. Both overall HRQOL and subscales were measured with a scale from 0 to 100, with higher values indicating better quality for each scale.

The translation of the English version STQOLI into the Malay version was done by the International Translation Network, a translating agency, using the forward-translation and back-translation. The content validity of the questionnaire was confirmed by the chief hematologist of the hospital.

**Data collection**

All eligible patients were approached as they came in for routine follow-ups at the TTC. Written informed consent was obtained prior to participation in the study. The administration of the questionnaire was done either via a face-to-face guided interview for those who cannot read or self-administration for those who can read. For the interview, the questions were read out word-by-word from the questionnaire and their responses were recorded. Only one trained interviewer was assigned for the interview.

**Data analysis**

Data were analyzed by IBM SPSS version 20.0 (IBM Corporation, Armonk, NY, USA). The sampling adequacy was assessed by Kaiser–Meyer–Olkin Measure of Sampling Adequacy. The internal structure of the questionnaire was assessed by principal component analysis with an orthogonal (varimax) rotation. Variables with eigenvalue more than 1 and factor loading more than 0.4 were retained. The reliability of the questionnaire was assessed by Cronbach’s alpha coefficient. The participants’ characteristics were presented by descriptive statistics.

**Results**

Eighty-two out of 147 thalassemia major patients aged 18 years and above were included in the study (56% participation rate). The reasons for exclusion were unable to understand the questions in Malay language (63 patients) and unwillingness to participate (2 patients). The participants’ characteristics are shown in Table 1. The appropriateness of the factor analysis was assessed by the Kaiser–Meyer–Olkin Measure of Sampling Adequacy. The Kaiser–Meyer–Olkin Measure of Sampling Adequacy was 0.635, which is acceptable. The Cronbach’s alpha coefficient for the total
The replicability of factor structure of an instrument can be demonstrated by using the exploratory factor analysis. In this application, strong replication across cultures and languages not only confirms the goodness of the translations of the instrument, but also the universality of the factor structure. Without a reasonable likelihood of replicability, the researchers have little reason to use a particular scale of the instrument.14

The purpose of this study was the adaptation and validation of the Malay version of the STQOLI. The STQOLI is a tool that specifically measures the quality of life of adult thalassemia major patients. This study was unable to replicate the internal structure of the Greek version of the STQOLI (Table 3) in the Sabah’s adult thalassemia patients. While exhibiting a different internal structure than the Greek version, the Malay STQOLI has the potential to be modified into a good tool to measure the quality of life of the adult thalassemia major patients in this region.

In comparison to the study by Lyrakos et al,11 our sample was younger (mean age 23.4 vs 37.2 years), consisted of more males (51.2% vs 26.6%), less educated (14.8% vs 51.6% with tertiary education), and none of them were married (0% vs 37.5% married). The differences in these cultural constructs especially the education level may explain in part the variation in the internal structures between the two studies.

The difference in structure can also be attributed to the ambiguity of the purported factors described by Lyrakos et al,12 which can be interpreted in many ways. For example, the study showed that the Greek thalassemia patients were able to distinguish between the concepts of “pain” (q28, q29) and “chelation impact of iron chelation pump” (q51, q56, q8, q7, q15). The Sabah’s thalassemia patients, meanwhile, treated “pain” as part of the latter concept and were logically not wrong. Another notable example was that the Greek patients treated items about time spent for treatment (q46, q47) as a different concept from items about social and work life (q20, q19, q16). The Sabah’s patients, however, seemed to think that the social and work life and time spent for treatment were indistinguishable.

It must also be mentioned that the Greek version of STQOLI was originally designed for self-administration. In our study, some participants need to be interviewed in person, which can be interpreted in many ways. For example, in answering the questionnaire due to the low literacy level. This may inadvertently affect the results of the study as the participants might not respond truthfully because they might wish to present themselves in acceptable manner. Meanwhile, the importance of literacy for self-reported health-related quality of life was highlighted by Cassis et al.15 It was reported that education level was not found to be a helpful criterion and thus an assessment of literacy level should be conducted.
Table 2 Exploratory factor analysis with varimax rotation for the 40 items

| Factor label                               | Item | Description                                                                 | EFA | Component |
|--------------------------------------------|------|------------------------------------------------------------------------------|-----|-----------|
|                                            |      |                                                                              |     | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | 9         | 10        | 11        | 12        |
| ICP impact                                 | q7   | I cannot sleep well because of the ICP                                      | 0.790 |           |           |           |           |           |           |           |           |           |           |           |           |
|                                            | q29  | Iron chelation procedure is painful to me                                   | 0.729 |           |           |           |           |           |           |           |           |           |           |           |           |
|                                            | q51  | The ICP troubles me                                                          | 0.727 |           |           |           |           |           |           |           |           |           |           |           |           |
|                                            | q25  | The body imprints (e.g. black spots in the belly from the iron chelation machine or the color on the skin) makes me feel uncomfortable | 0.682 |           |           |           |           |           |           |           |           |           |           |           |           |
|                                            | q28  | The intake of iron chelation drugs causes me painful abdominal discomforts  | 0.681 |           |           |           |           |           |           |           |           |           |           |           |           |
|                                            | q8   | QoL is affected by the time required by the iron chelation therapy with ICP | 0.667 |           |           |           |           |           |           |           |           |           |           |           |           |
|                                            | q6   | I lost valuable time to prepare the ICP                                      | 0.506 |           |           |           |           |           |           |           |           |           |           |           |           |
| Transfusion impact                         | q43  | The lack of blood units for my transfusion regime affects my emotional status negatively | 0.688 |           |           |           |           |           |           |           |           |           |           |           |           |
|                                            | q45  | The distance between my home and the thalassemia center creates a problem in my daily life | 0.638 |           |           |           |           |           |           |           |           |           |           |           |           |
|                                            | q17  | I am treated differently (negatively) in my workplace when they are aware about my disease | 0.621 |           |           |           |           |           |           |           |           |           |           |           |           |
|                                            | q44  | I experience reactions from the blood transfusion, which affects the general state of my health | 0.620 |           |           |           |           |           |           |           |           |           |           |           |           |
| Time spent on treatment and its effect     | q46  | The time that I miss for the transfusion affects my life                    | 0.764 |           |           |           |           |           |           |           |           |           |           |           |           |
| on work and social life                    | q47  | The time that I miss for the tests affects the quality of my life           | 0.713 |           |           |           |           |           |           |           |           |           |           |           |           |
|                                            | q20  | The disease limits my professional activities (work or school)              | 0.532 |           |           |           |           |           |           |           |           |           |           |           |           |
|                                            | q19  | I cannot go out with my friends as much as I would like to because of the disease | 0.494 |           |           |           |           |           |           |           |           |           |           |           |           |
|                                            | q50  | I am energetic                                                              | 0.466 |           |           |           |           |           |           |           |           |           |           |           |           |
|                                            | q16  | The time schedule of the intake of ICT affects my social life              | 0.458 |           |           |           |           |           |           |           |           |           |           |           |           |
| Sex life                                   | q39  | My sexual life is affected negatively because of the disease               | 0.867 |           |           |           |           |           |           |           |           |           |           |           |           |
|                                            | q38  | My sexual life is affected negatively because of the iron chelation therapy | 0.809 |           |           |           |           |           |           |           |           |           |           |           |           |
|                                            | q36  | Splenectomy affects me negatively                                          | 0.703 |           |           |           |           |           |           |           |           |           |           |           |           |
| Side effects of treatment                 | q9   | The per os chelation therapy causes me other side-effects                  | 0.769 |           |           |           |           |           |           |           |           |           |           |           |           |
| problems                                  | q34  | I feel somnolence because of the iron chelation                            | 0.654 |           |           |           |           |           |           |           |           |           |           |           |           |
|                                            | q30  | I suffer from arthralgias                                                    | 0.527 |           |           |           |           |           |           |           |           |           |           |           |           |
|                                            | q35  | I have arrhythmias because of the disease                                   | 0.840 |           |           |           |           |           |           |           |           |           |           |           |           |
|                                            | q32  | I have cardiological problems because of the disease                        | 0.607 |           |           |           |           |           |           |           |           |           |           |           |           |
|                                            | q33  | I feel fatigue when I have low hemoglobin                                  | 0.531 |           |           |           |           |           |           |           |           |           |           |           |           |
| Factor label | Item | Description                                                                 | EFA |
|-------------|------|-----------------------------------------------------------------------------|-----|
| Chelation   | q51  | The ICP troubles me                                                          | 0.961 |
| impact ICP | q6   | I lose valuable time to prepare the ICP                                      | 0.955 |
|             | q8   | QoL is affected by the time required by the iron chelation therapy with ICP | 0.945 |
|             | q7   | I cannot sleep well because of the ICP                                       | 0.926 |
|             | q15  | My social relationships are affected by the ICP                             | 0.924 |
| Disease effect in mobility and social relations | q41 | Disease complications affect QoL                                              | 0.732 |
|             | q40  | I feel tired because of the disease                                          | 0.731 |
|             | q20  | The disease limits my professional activities (work or school)               | 0.616 |
|             | q19  | I cannot go out with my friends as much as I would like to because of the disease | 0.588 |
|             | q30  | I suffer from arthralgias                                                    | 0.544 |
|             | q49  | I feel hopeless and depressed                                                | 0.521 |
|             | q31  | I have osteoporosis problems because of the disease                          | 0.503 |

Abbreviations: EFA, exploratory factor analysis; ICP, iron chelation pump; ICT, iron chelation tablet; QoL, quality of life.
### Table 3 (Continued)

| Factor label | Item                                                                 | EFA Component |
|--------------|----------------------------------------------------------------------|---------------|
|              |                                                                        | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 |
| Chelation    | q12 The amount of tablets for iron chelation troubles me              | 0.811         |
| impact ICT   | q14 The way of administration of ICT affects my nutrition            | 0.772         |
|              | q9 The per os chelation therapy causes me other side-effects          | 0.746         |
|              | q16 The time schedule of the intake of ICT affects my social life     | 0.728         |
| Daily activity | q46 The time that I miss for the transfusion affects my life         | 0.861         |
| time         | q47 The time that I miss for the tests affects the quality of my life | 0.775         |
|              | q45 The distance between my home and the thalassemia center creates a problem in my daily life | 0.703         |
| Psychological quality | q50 I am energetic                                                 | 0.875         |
|              | q2 My emotional status restricts my everyday life                    | 0.788         |
|              | q48 Feel calm and peaceful                                          | 0.747         |
| Effect of chronicity | q35 I have arrhythmias because of the disease | 0.709         |
|              | q23 Some features in my appearance have been changed, a fact that bothers me | 0.617         |
|              | q32 I have cardiological problems because of the disease             | 0.608         |
|              | q13 The disease affects my ability to eat or drink whatever I want   | 0.498         |
| Effect in sexual life | q38 My sexual life is affected negatively because of the iron chelation therapy | 0.757         |
|              | q39 My sexual life is affected negatively because of the disease     | 0.740         |
|              | q37 I entered puberty late due to the disease, which affects me      | 0.684         |
| Pain and fatigue | q33 I feel fatigue when I have low hemoglobin                  | 0.752         |
|              | q28 The intake of iron chelation drugs causes me painful abdominal discomforts | 0.648         |
|              | q29 Iron chelation procedure is painful to me                       | 0.513         |
| Transfusion impact | q44 I experience reactions from the blood transfusion, which affects the general state of my health | 0.306         |
|              | q43 The lack of blood units for my transfusion regime affects my emotional status negatively | 0.872         |
|              | q42 The origin of the blood (if it is substantially checked) that I will receive causes me anxiety and fear | 0.532         |
| Body image   | q24 I prefer that others not know about my disease                   | 0.728         |
|              | q17 I am treated differently (negatively) in my workplace when they are aware about my disease | 0.582         |
|              | q25 The body imprints (eg, black spots in the belly from the iron chelation machine or the color on the skin) makes me feel uncomfortable | 0.416         |
|              | q36 Splenectomy that affects me                                      | 0.787         |
|              | q34 I feel somnolence because of the iron chelation                  | -0.529        |

**Note:** Copyright ©2012. Dove Medical Press. Adapted from Lyrakos G, Vini D, Aslani H, Drosou-Servou M. Psychometric properties of the specific thalassemia quality of life instrument for adults. *Patient Prefer Adherence*. 2012;6:477–497. 11

**Abbreviations:** EFA, exploratory factor analysis; ICP, iron chelation pump; ICT, iron chelation tablet; QoL, quality of life; STQOLI, Specific Thalassemia Quality of Life Instrument.
prior to recruitment and those with limited literacy should be assisted to ensure the comprehension of the questions. 15

The results of this study showed that the Malay version of STQOLI needs to be modified to suit the local population. The modification of the questionnaire should be based on the eight interpretable factors found in this study. Furthermore, concurrent validity should also be examined in future research. This can be done by administering another quality of life tool together with the modified instrument and the correlation between the two instruments should be assessed. One notable limitation of this study was the small sample size. This, however, was unavoidable as many of the thalassemia patients in Sabah are illiterate and had to be excluded from the study.

Conclusion
This study was unable to replicate the internal structure of the Greek STQOLI in Sabah’s adult thalassemia patients. Instead, a new structure has emerged that can be used as a guide to develop a HRQOL questionnaire specific for adult thalassemia patients in Sabah. Future research in this area should focus on the eight factors identified from this study.

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Author contributions
All authors contributed toward data analysis, drafting and critically revising the paper and agree to be accountable for all aspects of the work.

Disclosure
The authors report no conflicts of interest in this work.

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