Dietary adherence component of modified end-stage renal disease adherence questionnaire (ESRD-AQ): translation and validation

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Abstract:

Introduction: A nutritionally balanced diet is crucial among end-stage renal disease (ESRD) patients to maintain their health status. An appropriate instrument is needed to assess ESRD patients' adherence towards dietary recommendations. Several questionnaires to measure adherence behaviours of ESRD patients are available but none has ever been translated into the Malay language. Therefore, this study aimed to translate the modified version of the End-stage Renal Disease Adherence Questionnaire (ESRD-AQ), focusing on the dietary adherence component, from English to Malay. **Methodology:** Forward and backward translations of the questionnaire were conducted involving experts in dietetics and linguistics to produce a pre-harmonized Malay translation and two backward English translations according to established guidelines. An expert committee reviewed these translated questionnaires to produce a harmonized version. This then underwent a pre-test conducted using cognitive interview, as well as face validity assessment,

involving 15 haemodialysis patients. **Results:** Minor amendments were made to several phrases during the expert committee review to ensure the translated questionnaire was contextually appropriate and culturally adapted to the Malay language. All questions in the Malay version of the modified ESRD-AQ achieved a Face Validity Index (FVI) value of 1.00, indicating high validity. **Conclusion:** The Malay version of the modified ESRD-AQ (Dietary Adherence Component) underwent translation and validation protocols, the findings of which indicate that it is clear and comprehensible for use in assessing dietary adherence among ESRD patients in Malaysia.

Keywords: Dietary adherence, End-stage renal disease, ESRD-AQ, Malay, Translation

Introduction:

End-stage renal disease (ESRD), also known as chronic kidney disease (CKD) stage 5, refers to a condition characterized by the permanent impairment of kidney function, resulting in a significant decrease in its ability to remove harmful waste substances from the body (Kidney Disease Improving Global Outcomes, 2013). The incidence of CKD rises with age, peaking in those sixty years of age or beyond. Diabetes mellitus is the leading cause of the disease, alongside hypertension and vascular disease, in both developed and developing countries (Hashmi, Benjamin & Lappin, 2023). According to the Global Burden of Disease Study (2017), accessibility of renal replacement therapy has greatly increased from 1990 to 2017. This is much needed as the worldwide occurrence of dialysis and kidney transplantation has risen by 43.1% and 34.4%, respectively, across all age groups (Bikbov et al., 2020).

Hemodialysis, a method of cleansing the blood extracorporeally using a catheter to eliminate metabolic waste in patients with kidney failure, is a procedure that has significant physical, psychological, economic, and social impacts on patients, leading to a decrease in their quality of life (Hackett & Jardine, 2017; Ronco & Clark, 2018). A nutritionally balanced diet is essential for individuals undergoing hemodialysis. End-stage renal disease patients frequently experience a range of dietary issues, including protein-energy depletion, mineral-bone abnormalities, electrolyte imbalance, and anemia, due to their kidneys not functioning at their maximum potential (Lee et al. 2020; Lim et al., 2020). Furthermore, patients' appetite and dietary consumption might potentially be affected due to side effects of hemodialysis such as headache, nausea, vomiting, and fatigue (Himmelfarb, 2005). Thus, individuals must adhere to the dietary guidelines by consuming an appropriate quantity of protein, calories, fluids, vitamins, and minerals to maintain good health.

Adherence, as defined by the World Health Organization, WHO (2003), refers to the extent to which a person's behaviour such as taking medication, following a diet, and executing lifestyle changes corresponds with agreed recommendations from a healthcare provider (Al-Salmi, Cook & D'Souza, 2022). Adherence behaviours assessment among ESRD patients usually includes four dimensions which are dietary intake, fluid restriction, adherence to medications, and dialysis attendance. There are several available questionnaires to assess adherence among ESRD patients such as the Renal Adherence Behaviour Questionnaire (RABQ), Renal Adherence Attitudes Questionnaire (RAAQ), Dialysis Diet and Fluid Non-adherence Questionnaire (DDFQ), as well as End-stage Renal Disease Adherence Questionnaire (ESRD-AQ). The RAAQ, a scale consisting of 26 items, RABQ (25 items), and DDFQ (eight subscales) measure adherence to dietary and fluid intake recommendations (Rushe & McGee, 1998; Vlaminck et al., 2001). On the other hand, the ESRD-AQ measures adherence to all four dimensions (Kim et al., 2010). According to Lim (2021), the ESRD-AQ is simple to administer and has been used locally by the author. However, none of these adherence questionnaires for dialysis patients has ever been translated into the Malay language.

In this study, we aimed to translate the dietary adherence subscale of the modified ESRD-AQ by Lim (2021) into the Malay language and validate it. The availability of the validated Malay version of ESRD-AQ (Dietary Adherence Component) would benefit

researchers as well as healthcare professionals in Malaysia to assess ESRD patients' dietary compliance and may contribute to better diet management among them.

Methodology:

End-stage Renal Disease Adherence Questionnaire (ESRD-AQ)

The original ESRD-AQ was developed in the English language by Kim et al. (2010). It comprises four subscales that assess treatment adherence behaviours across four dimensions: attendance to hemodialysis sessions (14 items), utilization of prescribed medications (9 items), adherence to fluid restrictions (10 items), and compliance with dietary recommendations (8 items). All subscales have demonstrated content validity scores exceeding 0.86 and exhibit strong reliability with an intraclass correlation coefficient (ICC) of more than 0.83. To focus on dietary compliance among hemodialysis patients, a local researcher adopted three questions from the dietary adherence component of ESRD-AQ, added a new question to measure self-reported dietary adherence on a continuous scale, and validated it (Lim, 2021). This modified ESRD-AQ (Dietary Adherence Component) which consists of four items was then used in the current study to be translated into Malay and validated. The first two pertain to the frequency and timing of the patient's most recent dietary education obtained from a healthcare professional. The rest of the questions are related to the patient's self-reported dietary adherence in the previous week. The responses for items no. 1, 2, and 3 are provided as multiple choice, while the final item (the dietary adherence level rating) is evaluated using a continuous scale of 0 to 100%, with a higher score indicating better compliance.

Study Design

The current study conducted the translation and validation of a questionnaire, which was originally in English, into the Malay language. This was accomplished following the instrument translation guideline by the WHO (2019).

Phase 1: Questionnaire Translation

The translation of the modified ESRD-AQ (Dietary Adherence Component) (E0) was conducted in five stages (Figure 1). The process began with forward translation from English to Malay by two independent bilingual translators, who are proficient in both languages. The first translator, who possessed expertise in terminologies used in healthcare and was familiar with the content of the questionnaire in both languages produced the first version of Malay translation (M1). Meanwhile, the other translator, a Malay language expert who was not aware of the purpose of the questionnaire, generated the second Malay translation (M2) to identify any slight variations from the original questionnaire (E0) (Tsang, Royse & Terkawi, 2017).

The second stage is the synthesis of the M1 and M2 to create a unified pre-harmonized Malay version (MH1) of the modified ESRD-AQ (Dietary Adherence Component). The MH1 then underwent a backward translation process by two proficient English translators who were blinded from the original version (E0) into two distinct English versions (E1 and E2, respectively) (Lau et al., 2017).

The next stage involved the harmonization process of E1 and E2 among expert committee members, which consisted of three senior lecturers with expertise in dietetics, public health nutrition, and community medicine, respectively. The E1 and E2 were deliberated upon, compared with the original version (E0), and harmonized to address and resolve any disparity, ambiguity, and inconsistency in the words and sentences of the items derived from the adopted questionnaire. Simultaneously, the MH1 was also deliberated by the expert committee and underwent necessary revision and modification, in line with the E1 and E2. After all versions of translations were thoroughly reviewed and concluded that both the translated and original versions exhibited semantic, idiomatic, experiential, and conceptual similarity, a consensus on all items was achieved to develop the harmonized version of the translated questionnaire (MH2) (Lau et al., 2017; Tsang et al., 2017).

Finally, the MH2 was pre-tested among 15 respondents from the target population using cognitive interviews. It was done on the hemodialysis patients that undergo routine hemodialysis three times per week (with each session lasting about four

hours) at the Pusat Dialisis Majlis Ugama Islam dan Adat Resam Melayu Pahang (MUIP), located in Kuantan, Pahang. The inclusion criteria also included patients who were not suffering from any major acute diseases or psychological disorders and had undergone dialysis for at least three months before enrolment into the study. The respondents were interviewed by the researcher on what they understood by each question and what they thought of when they heard a certain term or phrase. This was to ensure the translated items maintained the same meaning as the original items and to prevent any confusion regarding the translated questionnaire (Tsang et al., 2017; Geshina, 2019).

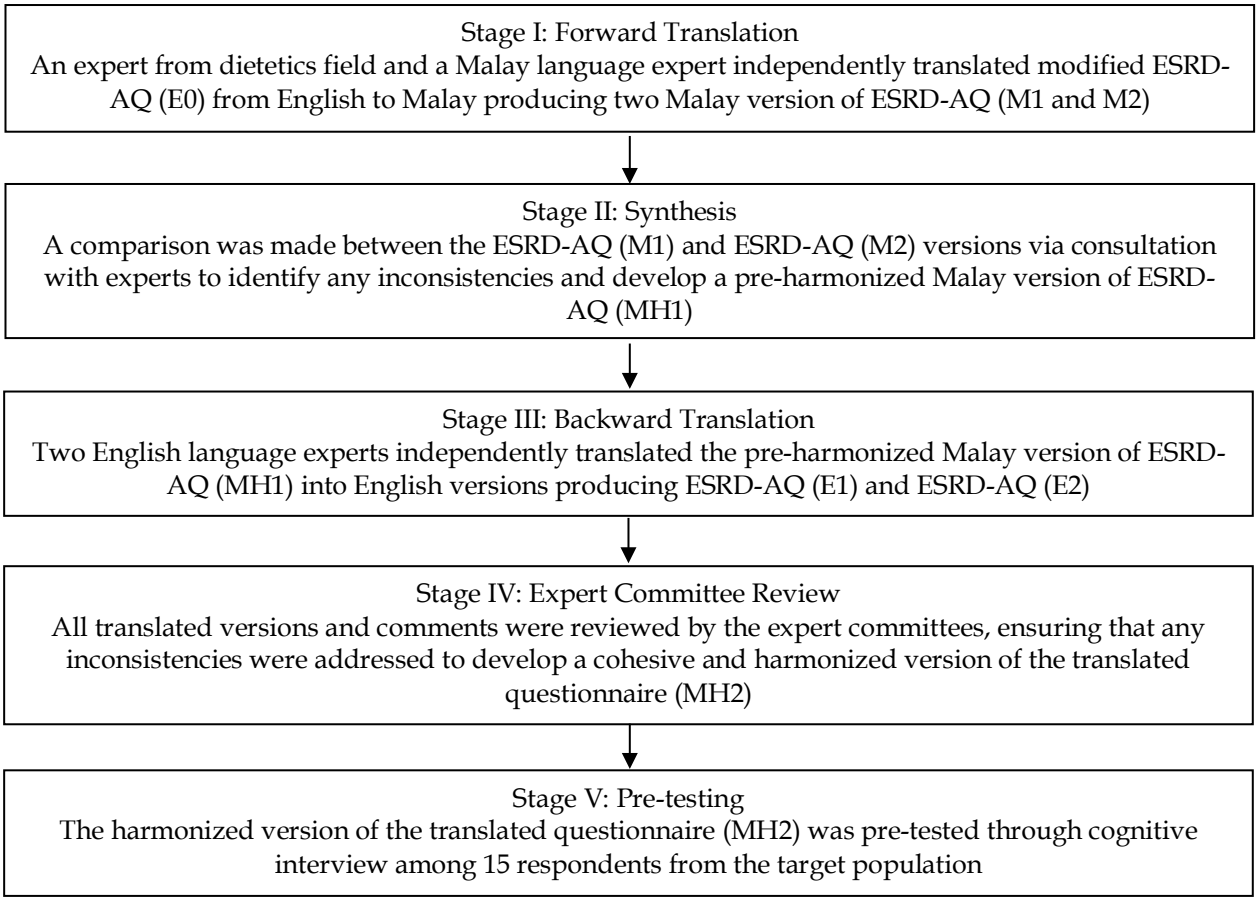

Figure 1: Flow chart of questionnaire translation procedure

Phase 2: Questionnaire Validation

Concurrently with the cognitive interview, a face validity assessment was undertaken by a similar group of hemodialysis patients (N=15). A minimum of 10 raters is acceptable for face validation (Yusoff, 2019) and to assess the suitability of the language in pre-testing (Geshina, 2019). The face validity was assessed using the MH2 where the respondents were required to rate their understandability and clarity of each question using a four-point Likert scale ranging from 'Item is not clear and understandable' to 'Item is very clear and understandable'. According to Yusoff (2019), the raters' understanding, and interpretation of the items will affect how well an assessment tool measures the intended construct. The questionnaire item with a face validation index (FVI) value of at least 0.80 was retained.

The FVI was calculated in two forms, i.e. FVI for item (I-FVI) and FVI for scale (S-FVI). Before calculating the FVI, the clarity and comprehension rating should be converted into a binary variable. A rating of 3 or 4 was recoded as 1, indicating clear and comprehensible, while a rating of 1 or 2 was recoded as 0, indicating not clear and not comprehended. Based on Yusoff (2019), the I-FVI value is the

percentage of raters that assign a clarity and comprehension rating of 3 or 4 to an item or question. The S-FVI/Ave is the mean value of the I-FVI scores for all questions on the scale, or the average of the proportion of clarity and comprehension as assessed by all raters. The proportion of clarity and comprehension was determined by calculating the average rating given by each rater. Meanwhile, the S-FVI/UA is an index that measures the percentage of questions that were rated as having a clarity and comprehension score of 3 or 4 by all raters. The Universal Agreement (UA) score was assigned a value of 1 when the item achieves 100% agreement among raters. Otherwise, the UA score was assigned a value of 0 (Yusoff, 2019).

No content validation was conducted in the current study. The purpose of the content validity assessment is to evaluate the degree to which an instrument measures the targeted construct and this depends on how well the items represent the content domains that the questionnaire is supposed to address (Fitzpatrick, 1983). The modified ESRD-AQ (Dietary Adherence Component) does not have any specific domains, but rather all its items assess a single construct (dietary adherence). In addition, the response to the items is in multiple choices; for instance, one of the items requires respondents to report when they last received diet education, and the answer options provided are 'last week', 'last month', 'irregularly', etc. Due to these reasons, a content validity assessment of the modified questionnaire was therefore not deemed necessary.

Ethical Approval and Participant Consent

The current study obtained its ethical approval from the International Islamic University Malaysia Research Ethics Committee (Reference No.: IIUM/504/14/11/2/IREC2024-001) and permission to conduct research activities from the Pusat Dialisis MUIP management. All the participants provided informed consent prior to their participation in the study.

Statistical Analysis

Descriptive statistics were performed with the presentation of continuous data through mean and standard deviation, and categorical data through absolute number and percentage.

Results:

Phase 1: Translation

The evaluation process demonstrated that pre-harmonized Malay version (MH1) did not require additional adjustment during the backward translation (from Malay to English) since the meaning of the sentences in both back-translated versions (E1 and E2) remained the same as in the original English version (E0).

During the expert committee review, however, a few phrases in the MH1 were revised to ensure they are contextually appropriate and accurately convey the same meaning as the original terminologies. For instance, the phrase "*Jarang sekali*" in the answer options for Item No. 2 was replaced with the phrase "*Jarang-jarang*" because it gives a more accurate meaning to the word 'Rarely'. Other than that, the phrase "*Cadangan pemakanan*" for Items No. 3 and 4 was replaced with "*Saranan pemakanan*". This is because it is a more apt translation for the term 'Dietary recommendation' and is more commonly used by nutritionists and dietitians in Malaysia. No comment about the misunderstanding of phrases or sentence contexts of the translated questionnaire was reported by the respondents during the cognitive interview.

Phase 2: Validation

Five males (33.3%) and 10 females (66.7%) aged between 24 and 72 years were involved in this assessment (Table 1). All the respondents were Malay and their dialysis vintage varied from six months to 22 years (mean ± SD, 51 ± 61 months).

The study participants (N=15) assessed the clarity and comprehension of the items as either 3 or 4, producing an index of 1.00 for all the items (Table 2). Therefore, the Malay version of the modified ESRD-AQ (Dietary Adherence Component) can be considered valid to be used among hemodialysis patients in Malaysia.

Discussion:

Assessing the dietary adherence of patients undergoing maintenance hemodialysis treatment is crucial for their overall well-being and quality of life

Table 1: Demographic characteristics of study participants (N=15)

Demographics	n	%	Mean ± SD
Age (years)			52.7 ± 12.6
Gender			
Male	5	33.3	
Female	10	66.7	
Ethnicity			
Malay	15	100	
Dialysis vintage (months)			50.5 ± 60.9

Table 2: Face Validity Index for the Malay Version of the modified ESRD-AQ (N=15)

Items	Question			
	1	2	3	4
S-FVI/Ave	1.00	1.00	1.00	1.00
S-FVI/UA	1.00	1.00	1.00	1.00
Proportion Clarity/Comprehensible	1.00	1.00	1.00	1.00

The original version of ESRD-AQ developed by Kim et al. (2010) has been translated and validated in several languages such as Arabic (Naalweh et al., 2017), Sinhalese (Lasanthika et al., 2023), and Portuguese language (Poveda et al., 2016). This study involved five stages of translation of the modified ESRD-AQ (Dietary Adherence Component) into the Malay language and face validation that was done concurrently with the cognitive interview of the translated questionnaire. During the translation process, only minor amendments were needed to ensure that certain phrases would convey the precise meaning of the original terms used in the English version.

It is crucial to accurately translate and adapt instruments in a manner that adheres to established criteria and ensures cultural and conceptual appropriateness, rather than merely focusing on linguistic or literal equivalency (Streiner, Norman & Cairney, 2015). The cultural equivalency of a translated instrument refers to the degree to which a word, concept, scale, or normative structure can be regarded as relevant and applicable to cultural groups other than the one in which these elements originated (Marsella & Kameoka, 1989). A stepwise validation for cross-cultural equivalence based on Flaherty et al. (1988) consists of five dimensions which are content, semantic, technical, criterion and conceptual equivalence but they are mutually exclusive of each other. On one or more of these dimensions, an instrument may be considered cross-culturally equivalent, but it may not be on the other dimensions (as cited in Beck, Bernal & Froman, 2003). This study examined the content, semantic, and conceptual equivalence of the translated questionnaire that was done through forward and backward translations, as well as an expert committee review. The goal was to ensure that the questionnaire could accurately assess the same theoretical constructs and maintain their meaning in the culture of interest. Furthermore, most of the words used in the original English version of the questionnaire were easily translatable and did not have multiple meanings in the Malay language. Consequently, when translated into Malay, there was no significant concern in terms of cultural equivalence.

Positive feedback and the absence of comments received from the target population regarding their inability to comprehend any phrase or sentence during the cognitive interview provides evidence that the translated questionnaire incorporates precise phrases and structured sentences that remain faithful to the original intent and concept of the questionnaire. Additionally, the face validation revealed good FVI values which indicates that the Malay version of the modified ESRD-AQ (Dietary Adherence Component) is clear and easily comprehensible.

To the best of our knowledge, the Malay version of the modified ESRD-AQ (Dietary Adherence

Component) is the only one that has been translated into the Malay language for use among our local populations. Since our investigation was focused on measuring dietary adherence among the respondents, we did not adopt all the available items in the original ESRD-AQ that was developed by Kim and colleagues (2010). However, the translation and validation of the whole ESRD-AQ, comprising four subscales, i.e., adherence to dialysis sessions, drug prescription, fluid restriction, and dietary guidelines, may be conducted by other researchers if they are interested in using the complete questionnaire. Other than that, the current study only involved Malay respondents. Although the selection of participants was based on purposive sampling for the stated inclusion criteria, the lack of non-Malay patients at the dialysis centre (where the study was conducted) which is in an east-coast state in the Peninsular Malaysia made this demographically typical. Nonetheless, the availability of this validated Malay version of modified ESRD-AQ (Dietary Adherence Component) could fill the gap for a tool to aid researchers and healthcare professionals in Malaysia in assessing ESRD patients' dietary compliance and improving their dietary management for better nutritional outcomes.

Conclusion:

The Malay version of the modified ESRD-AQ (Dietary Adherence Component) has been translated according to established guidelines and validated with good FVI values indicating its clarity and comprehensibility. Therefore, this questionnaire can be used to assess dietary compliance among ESRD patients in Malaysia.

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Conflict of interest:

The authors declare no conflict of interest.

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