Translation, Cross-Cultural Adaptation, and Psychometric Properties of the Malay-Translated Kihon Checklist Among Elderly Patients In The Emergency Department

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Abstract

Background

The insufficiency of gold standard assessment tools is the current challenge of frailty detection in an emergency department (ED). This study aimed to translate and evaluate the psychometric properties of the Malay-translated Kihon Checklist (KCL) for frailty assessment among Malaysian elderly patients presenting to the ED.

Method

The 25-item English version of the KCL was translated to Malay language through a forward and backward translation procedure. Three expert panels considered the items and pilot-tested on 15 elderly subjects. The final version was administered to 250 elderly patients who presented in the ED. Using confirmatory factor analysis (CFA), we compared the prior factorial models of the KCL. Model fits were determined using the Chi-square test/degree of freedom (*df*), comparative fit index (CFI), Tucker–Lewis index (TLI), root mean square error of approximation (RMSEA), Akaike information criterion (AIC), Bayesian information criterion (BIC), and expected cross-validation index (ECVI).

Results

Analysis revealed that none of the prior models (seven-, two-, and one-factorial model) fit the data. After modification, one-factor model with 10 items had a superior fit (Chi-square/*df*, 54.434/35; CFI, 0.962; TLI, 0.951; RMSEA, 0.047 (95% confidence interval (CI), 0.019–0.071); AIC, 94.434; BIC, 164.863; ECVI, 0.379). The internal consistency reliability for the pooled 10 items was acceptable, i.e., 0.786.

Conclusion

The CFA revealed that a one-factor model with 10 items had superior goodness-of-fit than other hypothesized factorial models. The scale demonstrated adequate construct validity and acceptable reliability with caution interpretation of some items.

Introduction

Frailty is a state of heightened vulnerability resulting from an ageing-associated decline in reserve and function across multiple physiologic systems (1). There is a growing awareness for routine assessment of frailty in emergency departments (EDs) (2). Although there is no local data on the prevalence of frailty, the worldwide prevalence of frailty in EDs was reported to be 7–80% (3–5). Frail patients have been associated with multiple adverse outcomes, including disability (6), falls (7), hospitalization (8), increased healthcare cost (Kojima, 2019), poor quality of life (9), and mortality (8). The added benefit of recognizing frailty in the ED is to prevent unnecessary invasive clinical management, inform a prognosis, and plan for discharge strategies (10).

Although multiple frailty screening tools have been developed, there is no standardization in the measurement of frailty in the ED. The two objective approaches commonly used in recognizing frailty are the phenotype model and the accumulated deficit model. The phenotype model defines frailty as a distinct clinical syndrome based on the presence of three out of the following five phenotypic criteria: unintentional weight loss, self-reported exhaustion, weakness, low physical activity, and slow walking speed (11). Meanwhile, the accumulated deficit model views frailty in the form of a frailty index. The index represents the health deficits of an individual to the total number of health deficits evaluated (12). While the phenotype model has a lack of agreed criteria for measuring each phenotype, the accumulated deficit model is too cumbersome to administer in clinical settings.

In busy EDs, self-reported frailty assessment or observed frailty is maybe more practical than objective assessment. Several instruments have been proposed for practical use in the ED, such Clinical Frailty Scale (CFS), PRISMA-7, Identification of Seniors at Risk, and Silver Code (5). The CFS, a judgment-based frailty assessment tool, was found to be more appropriate for use in the ED environment given the speed and ease of administration (10). However, the CFS has been criticized for making inappropriate escalation treatment decisions especially in patients with a long-term stable disability (13). The challenges are to identify reliable and validated tool for safe use in the ED. A screening tool intended for use in the ED setting should be based on a simple test, should require a little time, and can be interpreted by nonspecialist professionals.

A self-reported Kihon Checklist (KCL) has been proven to be effective in identifying and screening frail elderly patients in clinical settings (14). The KCL was developed by the Japan Ministry of Health, Labour and Welfare; it assesses seven domains of frailty: the activity of daily living, physical strength, nutrition, oral condition, socialization, memory, and mood (15). It consists of 25 items, and each item is rated either yes (1) or no (0), with a higher score indicating worse functioning (16). Although the KCL has never been validated in EDs, previous studies suggested that the instrument was easy, simple, and sensitive in identifying and screening frail elderly patients (14, 17). In this study, we translated the KCL into Malay and assessed the factorial validity and internal consistency in a sample of elderly patients in Malaysia ED.

Materials And Methods

The study was conducted at the ED, Universiti Kebangsaan Malaysia Medical Centre (UKMMC) in Kuala Lumpur, Malaysia, between June 2020 and December 2020. The study was conducted in three phases. Phase one includes the translation and cultural adaptation of the English version of the KCL. In phase two, content validation and pilot testing were performed. In phase three, we performed field testing to determine the reliability and factor structure of the Malay-translated KCL (Fig. 1). The study received ethical approval from the UKMMC research ethic committee (FF-2020-349).

Phase one: translation process

The permission to translate the English version of KCL to the Malay language was obtained from the original publisher. Two independent certified professional translators performed a forward translation of the English version of KCL to the Malay language; it was followed by backward translation by two different independent translators. The consensus was made on the translation of words, phrases, and items of the Malay version between researchers and translators; the Malay version was then compared with the original KCL. After some slight revisions, the final version of the Malay-translated KCL was prepared and ready to undergo the validation process.

Phase two: content validation and pilot testing

The content validity of the tool was conducted based on the quantitative methods described by Lynn (18). Three expert panels, which consist of a geriatrician, emergency physician, and family medicine specialist with an area of interest in geriatric medicine, were invited to review the Malay-translated KCL. The panels rated each item according to a four-point rating scale: 1 = not relevant, 2 = item needs major revision, 3 = relevant but needs minor revision, and 4 = very relevant; comments that carefully assessed and reworded.

As noted by Lynn (18), the content validity index (CVI) score was estimated both at the item level (I-CVI) and scale level (S-CVI). The I-CVI was calculated by dividing the number of experts that rated an acceptable grade (rating 3 or 4) by the total number of expert panels. The S-CVI was calculated based on two different methods: the average method (S-CVI/Ave) and the universal agreement method (S-CVI/UA). The S-CVI/Ave is the average of the I-CVI score for all items on the scale. Meanwhile, the S-CVI/UA is the proportion of the relevant items on the scale (rating 3 or 4) by all experts. Based on standard recommendations for content analysis, the item with I-CVI > 0.79 and scale with S-CVI $\geq$ 0.9 was considered to have excellent content validity (19). Additionally, a modified Kappa statistic (K) was computed to adjust I-CVI for chance agreement using the formula $K = (CVI - Pc) / (1 - Pc)$ (20). The probability of chance occurrence (Pc) was computed using the formula $Pc = [N! / A!(N-A)!] 0.5^N$, where N is the number of experts, A is the number agreeing on good relevance, and $!$ is a mathematical symbol for the product of all positive integers less than or equal to N . The K of 0.75 and above is considered to have the excellent agreement of relevance (21).

To confirm for face validity, we conducted a qualitative approach using cognitive interviews (22, 23). A pilot study was performed, in which the instrument was administered to 15 elderly patients who presented in the ED. The respondents provided feedback if they have difficulties answering the items and if any of the items were confusing or containing difficult vocabulary. The feedback was carefully assessed and reworded to give the final version of the Malay-translated KCL.

Phase three: field testing

Over 4 months between September 2020 and December 2020, a convenient sample of elderly patients aged 60 and above who presented in the ED of UKMMC were invited for the recruitment of the subject. Patients must be able to read and speak in the Malay language. We excluded patients with preexisting cognitive impairment and underlying psychiatric illness and who are critically ill. All included subjects provided written consent. Recruitment was conducted without interfering with clinical evaluation,

investigations, treatments, and interventions by the attending clinician. The following data were documented: age, sex, race, education level, marital status, living support, comorbidity, diagnosis, and disposition.

Frailty assessment

The Malay-translated KCL was self-administered by the patients or surrogates for patients with physical difficulties. No time limit was given during the administration. In addition to the Malay KCL, we used the CFS, a clinical judgment-based screening tool that evaluates specific frailty domains including comorbidity, function, and cognition, to assess frailty. The CFS has been validated and proven to be reliable to identify frailty in EDs (24). The CFS has a total score of 9, ranging from 1 (very fit) to 9 (terminally ill), and a total score of 5 or more is considered frail (25). Measurements using either instrument represent trait or baseline at two weeks before assessment as suggested from the previous study (26).

Data analysis and sample size

Statistical analysis was performed using the IBM Statistical Package for Social Sciences (SPSS) Statistics for Windows software and SPSS Amos (version 26.0; IBM Corp., Armonk, NY, USA). A descriptive analysis of study variables was summarized using frequency and percentages for categorical variables and mean $\pm$ SD or median (interquartile range) for continuous variables.

Confirmatory factor analysis (CFA) was performed to evaluate the factor structure of the Malay KCL. Three prior hypothesized factorial models of KCL were chosen. The first model was a seven-correlated factor model based on the original KCL (15), and the dimensions are as follows: the activity of daily living (items 1–5), physical strength (items 6–10), nutrition (items 11 and 12), oral condition (items 13–15), socialization (items 16 and 17), memory (items 18–20), and mood/cognition (items 21–25). The second model was a two-correlated factor structure based on the approach adopted by Fukutomi et al. (27). In this model, items 1–20 were classified under the lifestyle domain, and items 21–25 were classified under the mood or depression domain. The third factor was the one-factor structure where all the KCL items load on a single factor of frailty as proposed by Satake et al. (14). Model fit for each structure was assessed using the following fit statistics: χ^2 goodness-of-fit test, comparative fit index (CFI), Tucker–Lewis Index (TLI), and root mean square error of approximation (RMSEA). The insignificant (p -value > 0.05) model χ^2 goodness-of-fit test indicates model fit. The χ^2 goodness-of-fit is sensitive to the sample size. Therefore, for the well-fitting model, other fit indices, namely, CFI, TLI, and RMSEA, must be ≥ 0.93 , ≥ 0.92 , and ≤ 0.08 , respectively (28). The models were compared by examining the Akaike information criterion (AIC), Bayesian information criterion (BIC), and expected cross-validation index (ECVI), where smaller values indicated a better fit (29, 30).

The correlation of the KCL scores with the CFS was determined using Pearson, r correlation analysis. Internal consistency was evaluated using the Cronbach's alpha with values $\alpha > 0.7$ considered acceptable reliability (31). For all analysis, $p < 0.05$ was considered significant.

In performing factor analysis, we determined the sample size according to the number of items, whereby five subjects are required per item of the questionnaire (32). With 25 items in the questionnaire, the minimum subjects were 225.

Results

Translation and cross-cultural adaptation

The content validity of the Malay-translated KCL showed a high level of panel's agreement (Table 1). The S-CVI based on the average method and the universal agreement method were 0.97 and 0.92, respectively, indicating excellent internal validity. Individual item was marked as relevant ($K \geq 0.75$), except for two items, namely, numbers 14 and 19, which were revised following a recommendation by the panels. The translated item 14 "Have you recently choked on your tea or soup?" was reworded as "tea" or "soup" is not a commonly used drink among Malaysian. The final version explained the Malay translation of "Have you recently choked on a drink?" Meanwhile, the translated item 19 "Do you make a phone call by finding the phone number?" appeared to be a functional rather than memory assessment. The item was reformulated to explain the original English version "Do you make a call by looking up phone numbers and call on your own?" After the pretest ($n = 15$), there were no changes made to the response scale. All items were well understood by the respondents. The respondents took 5–10 minutes to complete the tool. Therefore, the final version of Malay-translated KCL was accomplished and ready for field testing.

Table 1
Calculation of I-CVI and Kappa score for the relevancy of each item (n = 3).

Item	Panels' agreement ^a	I-CVI	Pc ^b	K ^c	Interpretation
Q1. <i>Adakah anda menggunakan kenderaan awam seperti bas, teksi atau grab seorang diri?</i> Do you go out by bus or train by yourself?	3	1.00	0.125	1.00	Excellent
Q2. <i>Adakah anda boleh keluar dan menguruskan sendiri keperluan harian anda?</i> Do you go shopping to buy daily necessities by yourself?	3	1.00	0.125	1.00	Excellent
Q3. <i>Adakah anda mengendalikan sendiri deposit dan simpanan anda di bank?</i> Do you manage your own deposits and savings at the bank?	3	1.00	0.125	1.00	Excellent
Q4. <i>Adakah anda kadang kala menziarahi kawan-kawan anda?</i> Do you sometimes visit your friends?	3	1.00	0.125	1.00	Excellent
Q5. <i>Adakah anda meminta pendapat dari keluarga atau kawan-kawan?</i> Do you turn to your family or friends for advice?	3	1.00	0.125	1.00	Excellent
Q6. <i>Adakah anda biasanya menaiki tangga tanpa menggunakan susur tangan atau dinding sebagai bantuan?</i> Do you normally climb stairs without using handrail or wall for support?	3	1.00	0.125	1.00	Excellent
Q7. <i>Adakah anda biasanya boleh bangun dari kerusi tanpa sebarang bantuan?</i> Do you normally stand up from a chair without any aids?	3	1.00	0.125	1.00	Excellent
Q8. <i>Adakah anda biasanya boleh berjalan secara berterusan selama 15 minit?</i> Do you normally continuously walk for 15 minutes?	3	1.00	0.125	1.00	Excellent
Q9. <i>Adakah anda pernah jatuh dalam tempoh masa satu tahun yang lepas?</i> Have you experienced a fall in the past year?	3	1.00	0.125	1.00	Excellent

Item	Panels' agreement ^a	I-CVI	Pc ^b	K ^c	Interpretation
Q10. <i>Adakah anda merasa bimbang yang anda akan terjatuh semasa berjalan?</i> Do you have a fear of falling while walking?	3	1.00	0.125	1.00	Excellent
Q11. <i>Adakah anda merasa berat badan anda telah turun sebanyak 2 kg atau lebih dalam masa 6 bulan ini?</i> Have you lost 2 kg or more in the past 6 months?	3	1.00	0.125	1.00	Excellent
Q12. <i>Jika BMI kurang dari 18.5, item ini ditandakan 1</i> If BMI is less than 18.5, this item is scored 1.	3	1.00	0.125	1.00	Excellent
Q13. <i>Adakah anda menghadapi sebarang masalah untuk makan makanan yang keras berbanding 6 bulan yang lalu?</i> Do you have any difficulties eating tough foods compared to 6 months ago?	3	1.00	0.125	1.00	Excellent
Q14. <i>Adakah anda tersedak semasa minum air baru-baru ini?</i> Have you recently choked on your tea or soup?	2	0.67	0.375	0.47	Fair and revised
Q15. <i>Adakah anda selalu mengalami rasa kering dalam mulut?</i> Do you often experience having a dry mouth?	3	1.00	0.125	1.00	Excellent
Q16. <i>Adakah anda keluar rumah untuk melakukan aktiviti sekurang-kurangnya sekali seminggu?</i> Do you go out at least once a week?	3	1.00	0.125	1.00	Excellent
Q17. <i>Adakah bilangan keseluruhan waktu yang anda keluar dari rumah kurang pada tahun ini berbanding dengan tahun lepas?</i> Do you go out less frequently compared to last year?	3	1.00	0.125	1.00	Excellent

Item	Panels' agreement ^a	I-CVI	Pc ^b	K ^c	Interpretation
Q18. <i>Adakah keluarga dan kawan-kawan anda memberitahu anda yang anda mudah lupa?</i> Do your family or your friends point out your memory loss?	3	1.00	0.125	1.00	Excellent
Q19. <i>Adakah anda membuat panggilan telefon dengan mencari nombor telefon dan membuat panggilan dengan sendiri?</i> Do you make a call by looking up phone numbers?	2	0.67	0.375	0.47	Fair and revised
Q20. <i>Adakah anda menghadapi masalah mengingati tarikh hari ini?</i> Do you find yourself not knowing today's date?	3	1.00	0.125	1.00	Excellent
Q21. <i>Dalam masa 2 minggu yang lepas, adakah anda berasa kurang kepuasan dalam kehidupan seharian anda?</i> In the last 2 weeks, have you felt a lack of fulfillment in your daily life?	3	1.00	0.125	1.00	Excellent
Q22. <i>Dalam masa 2 minggu yang lepas, adakah anda berasa kurang gembira melakukan perkara-perkara yang dulunya anda gemari?</i> In the last 2 weeks, have you felt lack of joy when doing the things you used to enjoy?	3	1.00	0.125	1.00	Excellent
Q23. <i>Dalam masa 2 minggu yang lepas, adakah anda berasa sukar untuk melakukan sesuatu yang boleh anda lakukan dengan mudah sebelum ini?</i> In the last 2 weeks, have you felt difficulty in doing what you could easily do before?	3	1.00	0.125	1.00	Excellent
Q24. <i>Dalam masa 2 minggu yang lepas, adakah anda berasa tidak berupaya?</i> In the last 2 weeks, have you felt helpless?	3	1.00	0.125	1.00	Excellent
Q25. <i>Dalam masa 2 minggu yang lepas, adakah anda berasa penat tanpa sebab?</i> In the last 2 weeks, have you felt tired without a reason?	3	1.00	0.125	1.00	Excellent

Item	Panels' agreement ^a	I-CVI	P _c ^b	K ^c	Interpretation
Abbreviations: I-CVI, item-level content validity index; ^a number of panels marked 3 (relevant but needs minor revision) or 4 (very relevant); P _c , probability of chance occurrence, ^b calculated as $\frac{N!A!(N-A)!}{0.5^N}$; K, Kappa, ^c calculated as $K = (I-CVI - P_c) / (1 - P_c)$.					

Subject characteristics

The Malay KCL was tested on 250 elderly patients. The mean age of patients was 71.3 ± 7.2 years old, and 56% (140) were male. About half of the subjects (52.4%) were Malay, and 13.2% had no formal education. Most of the subjects (59%) had severe comorbidity as indicated by Charlson comorbidity score ≥ 5. Cardiac-related conditions were the most common presentation to the ED (n = 89, 35.5%), followed by surgical (n = 24, 9.6%), and trauma (n = 22, 8.8%).

Majority of the subjects were hospitalized (n = 165, 6%). The demographic and clinical characteristics of the subjects are shown in Table 2.

Table 2
Demographic characteristics of the subjects (n = 250).

Variables	Total
Mean age $\pm$ SD	71.34 $\pm$ 7.17
Male gender, n(%)	140 (56.0)
Body mass index (kg/m ²), mean $\pm$ SD	24.82 $\pm$ 4.33
Race, n(%)	131 (52.4)
Malay	99 (39.6)
Chinese	20 (8.0)
Indian	
Marital status, n(%)	10 (4.0)
Single	178 (71.2)
Married	62 (24.8)
Divorced/separated	
Living arrangement, n(%)	12 (4.8)
Living alone	238 (95.2)
Living with family	
Educational level, n(%)	33 (13.2)
No formal education	76 (30.4)
Primary	107 (42.8)
Secondary	34 (13.6)
Diploma and higher	
Employment, n(%)	236 (94.4)
Pensioner/retiree	14 (5.6)
Employed	
Charlson comorbidity index, n(%)	19 (7.6)
0–2	83 (33.2)
3–4	148 (59.2)
≥ 5	

Variables	Total
Clinical presentation, n(%)	89 (35.6)
Cardiac	24 (9.6)
Surgical	22 (8.8)
Trauma	17 (6.8)
Respiratory	17 (6.8)
Infectious disease	13 (5.2)
Endocrine	13 (5.2)
Neurology	13 (5.2)
Musculoskeletal	10 (4.0)
Gastrointestinal	10 (4.0)
Nephrology/urology	6 (2.4)
Oncology	16 (6.4)
Others	
Disposition, n(%)	165 (66.0)
Admitted	85 (34.0)
Discharged	

Preliminary analysis

Of the 250 cases, there were no missing values. Table 3 demonstrates the floor effects, ceiling effects, skewness, and kurtosis scores for the total and subdomain KCL. The skewness and kurtosis were within -2 and $+2$, except for subdomain nutrition. Screening for the individual items at the univariate level revealed non-normal distribution for all items. An assessment at multivariate normality revealed the kurtosis coefficient to be 187.470 with a critical ratio of 40.337. As the data were not normally distributed, the ML estimation with bootstrapping (33) was used to generate an accurate estimation of standard errors using the Bollen–Stine bootstrap p values and confidence intervals (34). Our sample size was 250, which was adequate for bootstrapping as recommended by Nevitt and Hancock (35). A cutoff $p > 0.05$ was considered for model fit.

Table 3
Descriptive statistics for Malay-translated KCL total and subdomain scores (n = 250).

	Mean (SD)	Minimum	Maximum	Reaching floor (%)	Reaching ceiling (%)	Skew	Kurtosis
Total score (25 items)	8.90 (4.27)	2	21	5 (2)	1 (0.4)	0.535	-0.327
Activity daily living (5 items)	2.75 (1.22)	0	5	4 (1.6)	13 (5.2)	-0.081	-0.940
Physical strength (5 items)	1.74 (1.54)	0	5	80 (32.0)	14 (5.6)	0.422	-0.889
Nutrition (2 items)	0.18 (0.42)	0	2	207 (82.8)	3 (1.2)	2.127	3.773
Oral condition (3 items)	0.93 (0.85)	0	3	89 (35.6)	11 (4.4)	0.571	-0.432
Socialization (2 items)	1.54 (0.56)	0	2	8 (3.2)	142 (56.8)	-0.695	-0.559
Memory (3 items)	0.44 (0.72)	0	3	170 (68.0)	3 (1.2)	1.489	1.302
Mood (5 items)	1.32 (1.36)	0	5	90 (36.0)	4 (1.6)	0.845	-0.310

Factor analysis

The three measurement models tested to evaluate the factor structure of the Malay KCL are shown in Fig. 2. The results showed that none of the models was a good fit for the data. All models were revised with careful observation of the modification indices. The model fit indices for seven-, two-, and one-factor models are shown in Table 4. Overall, multiple fit indices demonstrated that the best model fit was the one-factor model with 12 items (Chi-square/degree of freedom (*df*), 81.474/54 ($p = 0.096$); CFI, 0.947; TLI, 0.935; RMSEA, 0.045 (95% confidence interval (CI), 0.023–0.064); AIC, 129.474; BIC, 212.989; ECVI, 0.520). The standardized coefficients ranged from – 0.01 to 0.78, and 10 of the 12 items were statistically significant ($p < 0.05$). These two items were removed, and the final model comprises 10 items with fit indices of Chi-square/*df*, 54.434/35 ($p = 0.116$); CFI, 0.962; TLI, 0.951; RMSEA, 0.047 (95% CI, 0.019–0.071); AIC, 94.434; BIC, 164.863; and ECVI, 0.379 (Fig. 3). Scores on the three instruments that significantly correlated with each other suggested good convergent validity (Malay KCL 10 items vs. 25 items, $r = 0.925$; Malay KCL 10 items vs. CFS, $r = 0.787$).

Table 4
Summary for model fit indices for the Malay KCL confirmatory factor models.

Model	Chi-square/df	Bollen–Stine bootstrap, p	CFI	TLI	RMSEA (95% CI)	AIC	BIC	ECVI
Model 1	536.818/524	0.004	0.770	0.728	0.067 (0.059–0.075)	678.818	928.842	2.726
Model 2	744.573/274	0.004	0.596	0.560	0.085 (0.078–0.092)	846.573	1026.167	3.400
Model 3	771.015/275	0.004	0.617	0.581	0.083 (0.076–0.090)	871.015	1047.088	3.498
Model 1 (revised)	236.861/168	0.109	0.922	0.902	0.041 (0.028–0.052)	362.861	584.714	1.457
Model 2 (revised)	104.523/76	0.104	0.950	0.940	0.039 (0.017–0.056)	162.523	264.645	0.653
Model 3 (revised)	81.474/54	0.096	0.947	0.935	0.045 (0.023–0.064)	129.474	212.989	0.520
Model 1, seven-factor model based on Arai and Satake (2015); Model 2, two-factor model based on Fukutomi et al. (2015); Model 3, one-factor model based on Satake et al. (2016).								
<i>df</i> , degree of freedom; CFI, comparative fit index; TLI, Tucker–Lewis index; NFI, normed fit index; RMSEA, root mean square error of approximation; CI, confidence interval; AIC, Akaike information criterion; BIC, Bayesian information criterion; ECVI, expected cross-validation index.								

Reliability

The analysis of the reliability of the Cronbach's alpha for the pooled 10 items showed acceptable internal consistency, i.e., 0.786. Most items appeared to have a good correlation with other items (item-total correlation > 0.3), except for items 5 and 13 (range, 0.187–0.647) (Table 5).

Table 5
Item-total statistics for the one-factor model of the Malay KCL with six items (n = 250).

Items	Corrected item-total correlation	Cronbach's alpha if item is deleted
Q2	0.498	0.762
Q5	0.224	0.790
Q6	0.611	0.746
Q7	0.597	0.749
Q8	0.647	0.740
Q13	0.187	0.793
Q14	0.308	0.784
Q16	0.455	0.768
Q22	0.372	0.777
Q23	0.557	0.754

Discussion

In this study, we translated the English version of the KCL into Malay and evaluated the validity and reliability in a sample of elderly patients in the ED. The psychometric evaluation showed satisfactory validity and reliability, supporting the use of the one-factor model with 10 items. In the first part of the study, we translated and evaluated the content validation of the instrument. We adopted the Lynn method (18), an accepted approach for establishing the content validity of instruments. The findings suggested a high degree of agreement beyond chance in most of the individual item as measured by the modified Kappa. A small number of items had a minor cultural and syntactical issue, and both items were revised through discussions with the research team. The instrument was pretested using cognitive interview to enhance the face validity of the instrument (36). Together with face validity, the instrument provides a robust foundation for future validation of the Malay-translated KCL.

There is limited consensus regarding the dimension of the KCL. The multidimensional factor structure of the KCL was proposed based on the original version, in which the items are divided across seven structured domains (15). Meanwhile, Satake et al. proposed for unidimensional factor structure based on the significant correlation between the total KCL score with frailty phenotypes (14). To date, only one study examined the factor structure of the KCL (37). The Spanish version of the KCL suggested the one-factor model with 15 items in a sample of community-dwelling Spanish older adults (37). In this study, we conducted a CFA to confirm whether the prior hypothesized factor models of the KCL were applicable to Malaysian elderly patients in ED settings.

We did not perform an exploratory factor analysis as the CFA provides stronger evidence in support of the validity of the instrument with regard to the model dimension (38). After carrying CFA, none of the models confirmed the factor structure of the Malay KCL, comparable with the findings reported in the Spanish sample (37). The proposed one-factor model of the Malay KCL fit well after extensive revisions with many of the items were deleted. However, only six items had factor loading larger than 0.5, which is the recommended minimum factor loading in CFA (39). Most of the remaining items predominantly relate to function and physical concern, which might reflect findings from previous studies that have suggested that the physical function remains the most recognized features of frailty in the elderly (11, 40). In addition, a previous study suggested that the physical component of the original KCL had the highest influence on frailty score (41). As suggested by Awang (Awang, 2015), the items were maintained as the fit statistics have achieved the required level.

The internal consistency reliability of the 10-item Malay KCL was found to be acceptable. The item-total correlation for most items was seen to be within 0.30–0.70, indicating a good relationship of items with the construct (42). The total score for the 10-item Malay KCL was significantly correlated with the total score of the 25-item KCL, suggesting that both versions shared a similar construct. The 10-item Malay KCL also showed a strong correlation with the CFS, indicating that these two tools measure similar concepts. However, because a large number of items (> 20%) were removed during the model revision, the model needs a revalidation study on a new sample of older patients in the ED (43).

The findings of our study did not support the KCL definition of frailty as there was insufficient cognitive and nutrition evaluation in the instrument. These findings should be interpreted in the context of potential limitation. First, the current study excluded patients with an underlying cognitive impairment since they are often viewed as barriers to the completion of self-reported questionnaires. Patients with dementia may exhibit a wide range of cognitive and behavioral symptoms that potentially interfere with their ability to answer self-reported questionnaires. However, several studies emphasized the inclusion of patients with cognitive impairment in frailty assessment (44). It is also argued the nutrition component is underdeveloped. The cutoff body mass index (BMI) of 18.5 kg/m² to define frailty have seen conflicting evidence, in which study by Crow and colleagues has suggested of a poor relationship between frailty and BMI-defined obesity (45). Second, although KCL was self-administered, in some instances, we asked relatives as a surrogate to fill in the questionnaire. Family members might not recognize or addressed subtle changes in frailty features among patients. In some instances, caregivers might overestimate the actual functional deficits than did patients (46).

Conclusion

This study supports the acceptable psychometric properties of the Malay-translated KCL in a sample of an elderly patient in the ED. The CFA revealed that the one-factor model with 10 items had superior goodness-of-fit than other hypothesized models. The scale demonstrated adequate convergent validity and acceptable reliability with caution interpretation of some items.

Declarations

ETHIC APPROVAL AND CONSENT TO PARTICIPATE

The study received ethical approval from the University Kebangsaan Malaysia Medical Centre (UKMMC) research ethic committee (FF-2020-349).

All included subjects provided written *informed* consent.

All methods were carried out in accordance with relevant guidelines and regulations.

CONSENT FOR PUBLICATION

Not applicable

AVAILABILITY OF DATA AND MATERIALS

The data generated or analysed during this study are included in this published article [Raw data Kihon.csv].

COMPETING INTERESTS

No conflict of interest has been declared by the authors.

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AUTHOR CONTRIBUTIONS

HE, SMJ and AAB designed the study.

SNLS collected the data.

HE and SNLS performed the analyses and interpreted the data.

HE supervised the study.

HE and SNLS drafted the manuscript.

All authors read and approved the final manuscript.

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Figures

Figure 1

Flowchart of the translation process and cross-cultural adaptation.

Figure 2

Path diagram of the factor structure of the Malay-translated KCL. Model 1: Seven-factor model based on Satake et al. Model 2: Two-factor model based on Fukutomi et al. Model 3: One-factor model with 25 items based on Satake et al.

Figure 3

The revised one-factor model of the Malay KCL with 10 items.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [RawdataKihon.csv](#)