Validity and reliability of the loco-check questionnaire after cross-cultural adaptation for Indonesia

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1. Introduction

The progression of the Indonesian demographic structure shows a growing number of people aged over 65 with 17.37 million elderly accounting for 6.51% of the total population [1]. As a result, there has been a rise in the number of people with disabilities as people over the age of 65 constitute 40% of the disabled population, and many suffer from frailty and/or musculoskeletal disorders for which they are likely to require care services [2–4]. One cause of disability in this group is decreased mobility, which may partly be due to locomotive syndrome [5].

Locomotive syndrome, proposed by the Japanese Orthopedic Association in 2007, is a condition of reduced mobility caused by impairment of the locomotive organs, and manifests as a difficulty in sit-to-stand activities and gait [6]. The progression of this syndrome could lead to overall disability, which may be a predictor of mortality [7].

In Indonesia, close to 40% of the disabled population is affected by locomotive syndrome [8]. Early detection of locomotive syndrome is important to prevent its progression. However, routine examinations for locomotive syndrome are not conducted in Indonesia due to the current non-uniformity of the screening tools. Therefore, a local tool is required to screen for locomotive syndrome in Indonesia. In 2019, a study by Hayyan et al. [9] demonstrated the validity and reliability of the loco-check questionnaire in Indonesia. Currently, a cross-cultural adaptation is needed to standardize the questionnaire into the Indonesian language and culture. The aim of this study was to obtain a valid Indonesian version of the loco-check questionnaire that has been adapted as per Indonesian language and cultural conventions (through a cross-cultural adaptation process).

Methods: The subjects in the study were community-dwelling geriatrics over 65 years of age who were recruited using consecutive non-probability judgment sampling according to the inclusion criteria. This study, conducted from February to October 2019, was divided into two stages consisting of: (1) language and cultural adaptation; (2) validity and reliability testing. The seven items on the loco-check were translated using forward-backward translation. The final Indonesian version of the loco-check questionnaire was generated through an expert panel discussion. The validity and reliability were evaluated using concurrent validity and Cronbach’s alpha using SPSS Version 23.0.

Results: In the first stage, the first and second trials showed a strong correlation between the English and Indonesian versions of the questionnaire with $r = 0.997$ ($p < 0.001$) and $r = 0.825$ ($p = 0.003$), respectively. The final Indonesian version of the loco-check questionnaire had a good validity and reliability with $r = 0.981$ ($p < 0.001$) and Cronbach’s alpha of 0.768, respectively.

Conclusion: The Indonesian cross-cultural adaptation of the loco-check questionnaire is a valid and reliable general questionnaire that could enable screening for locomotive syndrome in Indonesia.
syndrome can impair the activities of daily living, thus, appropriate interventions are necessary [7].

Most of the studies on locomotive syndrome have originated in Japan including the study of loco-check questionnaire. Loco-check is a 7-item questionnaire screening tool for locomotive syndrome based on the activities of daily living (ADL) consisting of the following seven items: 1) you cannot put on a pair of socks while standing on one leg; 2) you stumble or slip in your house; 3) you need to use a handrail when going upstairs; 4) you find it difficult to do housework requiring physical strength; 5) you find it difficult to walk home carrying a shopping bag weighing about 2 kg; 6) you have difficulty walking continuously for 15 min, and 7) you cannot get across the road at a crossing before the traffic light changes. The examinee is suspected to have locomotive syndrome if at least one of the items on the questionnaire is positive. Another way to quantify locomotive syndrome is by calculating the cumulative number of times that “yes” was selected [3,8].

No studies on locomotive syndrome have been conducted in Indonesia highlighting the urgent need to build awareness among health professionals and the elderly; and create a screening tool to avoid the dangers of undiagnosed and untreated locomotive syndrome among the Indonesian elderly. This calls for the adaptation of the loco-check according to Indonesian language and cultural conventions to prevent inequivalent measurements of the intended values due to differences in language, culture, socio-demographics, diseases, personal behaviors, and social environment [9]. As such, the aims of this study were to cross-culturally adapt the Loco-check questionnaire and to achieve content validity at the same conceptual level for its use in Indonesia [10]. We hypothesize the Indonesian language loco-check questionnaire valid and reliable for Indonesian people.

2. Materials and methods

2.1. Subjects

The subjects were community-dwelling geriatrics directly recruited by the recruitment assistants from the Doctor Soetomo General Academic Hospital Physical Medicine and Rehabilitation Outpatient Clinic with consecutive non-probability judgment sampling according to the inclusion criteria which were as follows: the elderly above 60 years of age, those able to comprehend both English and Indonesian. The recruitment assistants made an online google form message, filled with information regarding the study subject recruitment need, sent to the potential subjects. Subjects who agreed to volunteer were contacted by the recruitment assistant, subjects were asked to fill in the standard loco-check questionnaire first and the Indonesian loco-check questionnaire the day after. The details of consent, the informed consent form, and the questionnaire were provided to the subjects in the form of either printed copies or electronically, based on their preference. There were a total of 50 subjects enrolled in this study, 20 subjects recruited in the first stage of the study for preliminary correlation tests, 10 for the first and another 10 for the second [11]. Another 30 subjects were recruited for the second stage, following the guideline from Beaton et al., for the prefinal testing of the cross-culturally adapted questionnaire [10]. The study was approved by the local ethics committee.

2.2. Study design

This was a two-staged study conducted from February 2019 to October 2019. The first stage consisted of a thorough cross-cultural adaptation following a modified Beaton et al. guideline for cross-cultural adaptation that was used to convey the intention of the original word and sentence and to avoid differences in translation that may come from differences in the meaning of words, syntactic contexts, or cultural contexts [12–15]. The steps of this cross-cultural adaptation involved: translations, first synthesis, first correlation testing, back translations, second synthesis, second correlation testing, and expert panel discussion as described in Table 1.

Two translators were used during each translation and back translation process. This was intended to eliminate the gap of perception that is commonly found among translators followed by comparing and using a consensus form [10]. The back translation process was used to find any discrepancies between the original form and the translated ones, done by two translators with no knowledge of the original version [16,17]. Preliminary correlation measurements were performed as a preliminary confirmation step for each translation and back translation consensus to ensure equivalence in translation [11].

The second stage consisted of the validity and reliability pre-final testing of the Indonesian language loco-check according to Beaton’s method guideline. Thirty geriatric respondents from the Doctor Soetomo General Academic Hospital Physical Medicine and Rehabilitation Outpatient Clinic were recruited, they were asked to fill in the standard loco-check followed by the pre final Indonesian loco-check the day after. Each stage is described in Table 1.

2.3. Statistical analysis

All data were collected using data extraction form. The analysis was performed using SPSS Version 23.0 (IBM Corp., Armonk, NY). Exploratory data analysis was performed to evaluate the characteristics of the subjects and sample distribution. The evaluation of the Indonesian translation and adoption of the loco-check through correlation testing between the standard English language loco-check and Indonesian language loco-check versions was performed using Pearson’s and Spearman’s correlation tests. The correlation was valid for a p value < 0.05 and r value > 0.3. The internal reliability was tested using Cronbach’s alpha and considered reliable when Cronbach’s alpha was >0.7.

3. Results

3.1. The first stage

The first translations consensus early Indonesian language loco-check is reported in Table 2. Respondents’ ages for the first trial correlation testing ranged from 60 to 85 years, most were female (70%). Spearman’s test showed a strong correlation between the standard loco-check and the early Indonesian version (r = 0.997, p < 0.001). During the first trial, the total scores of the English loco-check and Indonesian loco-check were mostly similar, ranging from 0 to 6; one respondent had the score changed from a 3 in the English loco-check to a 4 in the Indonesian loco-check.

The back translations consensus produced a form similar to the standard questionnaire (Table 2). Spearman’s test showed a strong correlation between the English language back-translated loco-check and the early Indonesian loco-check (r = 0.825, p = 0.003) (Table 4). During the second trial, the total score of the English loco-check after back translation, which ranged from 0 to 3, was better than that of the Indonesian version as shown in Table 3.

The expert panel discussion suggested a few notable changes and produced the pre final form of the Indonesian loco-check questionnaire as shown in Table 2.
 VALIDITY AND RELIABILITY TESTING OF THE INDONESIAN LANGUAGE LOCO-CHECK

Stage 1

Translation of the standard loco-check from English to Indonesian language by two sworn certified translators (T1 and T2).

Step 2

Both translators (T1 and T2) discussed the discrepancies between their versions until a consensus on the early Indonesian language loco-check was achieved.

Step 3

Correlation testing between the early Indonesian language loco-check and the standard loco-check using data gathered from 10 community-dwelling geriatric respondents (first trial).

Step 4

Back translation of the early Indonesian language loco-check to English by a different set of sworn certified translators (T3 and T4).

Step 5

Both translators (T3 and T4) discussed the discrepancies between their versions until a consensus on the back-translated loco-check was achieved.

Step 6

Correlation testing between the back-translated loco-check and the early Indonesian language loco-check using data gathered from 10 community-dwelling geriatric respondents (second trial).

Step 7

Expert panel evaluation of the original translation, the back translation, and the correlation testing data. This final step of the first stage was performed by 7 physiatrists, an epidemiologist, a language expert, and a translator, resulting in the genesis of the pre final Indonesian language loco-check.

Stage 2

Validity and reliability testing of the Indonesian language loco-check. Thirty community-dwelling geriatric respondents were recruited for this purpose. They were asked to fill in the standard loco-check followed by the pre final Indonesian loco-check a day after.

Table 1

Cross-cultural adaptation procedures of Loco Check Questionnaire for Indonesia.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Translation of the standard loco-check from English to Indonesian language by two sworn certified translators (T1 and T2).</td>
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</tr>
</tbody>
</table>

Table 2

Translation and cross-cultural adaptation of the Loco-check for Indonesia.

<table>
<thead>
<tr>
<th>No</th>
<th>Standard English Loco-check</th>
<th>Early Indonesian Loco-check</th>
<th>Back Translated Loco-check</th>
<th>Final Indonesian Loco-check</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>You cannot put on a pair of socks while standing on one leg</td>
<td>Anda tidak dapat memasang sepasang kaos kaki saat anda sedang berdiri dengan satu kaki</td>
<td>You could not put on your pair of socks while standing on one foot</td>
<td>Anda tidak mampu mengenakan kaos kaki saat anda sedang berdiri dengan satu kaki.</td>
</tr>
<tr>
<td>2</td>
<td>You stumble or slip in your house</td>
<td>Anda tersandung atau terpeleset di rumah Anda</td>
<td>You stumbled or slipped at your home</td>
<td>Anda mudah tersandung atau terpeleset di rumah Anda</td>
</tr>
<tr>
<td>3</td>
<td>You need to use a handrail when going upstairs</td>
<td>Anda perlu menggunakan pegangan tangga saat menaiki tangga</td>
<td>You need to hold the handrails when climbing the stairs</td>
<td>Anda perlu memegangi pegangan tangga saat naik ke lantai atas</td>
</tr>
<tr>
<td>4</td>
<td>You find it difficult to do housework requiring physical strength</td>
<td>Anda mengalami kesulitan untuk melakukan pekerjaan rumah tangga yang membutuhkan kekuatan fisik</td>
<td>You have difficulty doing domestic chores that require physical strength</td>
<td>Anda mengalami kesulitan untuk melakukan pekerjaan rumah tangga yang membutuhkan kekuatan fisik</td>
</tr>
<tr>
<td>5</td>
<td>You find it difficult to walk home carrying a shopping bag weighing about 2 kg</td>
<td>Anda mengalami kesulitan saat harus berjalan ke rumah sambil mengenakan tas belanja seberat sekitar 2 kg</td>
<td>You have difficulty walking home while carrying a shopping bag weighing around 2 kg</td>
<td>Anda mengalami kesulitan saat harus berjalan ke rumah sambil membawa tas belanja seberat sekitar 2 kg</td>
</tr>
<tr>
<td>6</td>
<td>You have difficulty walking continuously for 15 min</td>
<td>Anda mengalami kesulitan saat harus berjalan terus-menerus selama 15 menit</td>
<td>You have difficulty walking continuously for 15 min</td>
<td>Anda kesulitan berjalan selama 15 menit tanpa berhenti</td>
</tr>
<tr>
<td>7</td>
<td>You cannot get across the road at a crossing before the traffic light changes.</td>
<td>Anda tidak dapat menyembunyikan jalan di tempat penyeberangan sebelum lampu lalu lintas berganti warna</td>
<td>You cannot cross the road at the crossing before the traffic light changes color</td>
<td>Di tempat penyeberangan, Anda tidak mampu mencapai seberang jalan sebelum lampu lalu lintas berganti warna</td>
</tr>
</tbody>
</table>

3.2. Second stage

The characteristics of the stage two respondents are shown in Table 5. There was a strong correlation between the final Indonesian loco-check and the standard loco-check ($r = 0.981, p < 0.001$; Spearman's test) (Table 6). The Indonesian loco-check was also considered reliable and valid with a Cronbach's alpha value of 0.768 for all the questions in the questionnaire (Table 6).

4. Discussion

This study revealed that the Indonesian cross-cultural adaptation of the loco-check questionnaire is a valid and reliable general questionnaire that could enable screening for locomotive syndrome in Indonesia, could further expose dependency problem in the elderly, and accelerate the delayed development of geriatric medicine in Indonesia [18,19].

Locomotive syndrome is a condition of decreased mobility caused by impairment of the locomotive organs. The signs and symptoms are pain, range of motion limitation, deformities, malalignment, balance disturbance, and a reduced walking speed. They may be misunderstood as features of normal aging due to a slowly progressing degeneration of the locomotive organs [20,21]. A geriatric screening tool may bridge this gap [22]. There are self-administered questionnaires, such as Loco-check, 25-question Geriatric Locomotive Function Scale (GLFS-25), and GLFS-5. There
are also physical function examinations such as timed up and go test (TUG), one-leg standing time, back muscle strength, 10 m gait time, maximum stride and grip strength, and acceleration signals during gait seen using an accelerometer [23,24]. The choice of adapting the loco-check was made because of its simplicity that can be spread to the community to make people become aware of the declining motor function.

There are a few equivalences that must be reached for a translation to be accepted: semantic, idiomatic, experiential, and conceptual [25]. The expert panel discussion, held with the assistance of physiatrists, epidemiologists, language experts, and translators, helped fulfill these requirements [10]. The expert panel acts like a multidisciplinary committee to ensure that the content of the final form of the questionnaire stays true to the original by identifying and correcting translation errors and linguistic clumsiness [26]. The first notable modification was suggested for the second item: “You stumble or slip in your house,” translated as, “Anda kesulitan berjalan selama 15 menit tanpa berhenti, (You have difficulty walking 15 min without stopping).” The original sentence means the subject is not able to walk continuously for 15 min, this may produce a misunderstanding according to Indonesian language and culture that the respondents are not able to walk continuously due to any hindrance regardless of the relation to cause. The expert panel suggested that the sentence changed into “Anda kesulitan berjalan selama 15 menit tanpa berhenti, (You have difficulty walking for 15 min without stopping),” to build the subject’s awareness of the disability of whether he/she needs to make occasional stops when walking for 15 min due to the impairment.

The second notable addition was made to the seventh item: “You cannot get across the road at a crossing before the traffic light changes,” translated as, “Di tempat penyebrangan, Anda tidak mampu mencapai seberang jalan sebelum lampu lalu lintas berganti warna (You cannot cross the road at the crossing before the traffic light changes color).” A color change phrase was added to the question to accommodate the usual form of the traffic light-related expression used in Indonesia. The adherence to traffic rules in Indonesia is different from that in Japan. Indonesians showed a lower adherence to traffic rules as revealed by several incidences of driving through red light, ignoring speed limits, and many other traffic violations [27]. Regularjaywalking revealed a poor understanding of the rules by pedestrians [28]. These issues may prompt the creation of a modified screening tool for locomotive syndrome that is based on the original loco-check but is better suited to the Indonesian culture and habits.

The expert panel discussion highlighted certain issues that may need to be addressed later through further studies. There were some items on the questionnaire with loose adherence to the daily life and culture of Indonesia. The first was statement number one: "you cannot put on a pair of socks while standing on one leg." Most Indonesians do not wear socks or shoes during their daily activities as part of the culture of Indonesia. The adherence to traffic rules in Indonesia is different from that in Japan. Indonesians showed a lower adherence to traffic rules as revealed by several incidences of driving through red light, ignoring speed limits, and many other traffic violations [27]. Regularjaywalking revealed a poor understanding of the rules by pedestrians [28]. These issues may prompt the creation of a modified screening tool for locomotive syndrome that is based on the original loco-check but is better suited to the Indonesian culture and habits.

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The second notable change was made to the sixth item: “You have difficulty walking continuously for 15 min,” was translated as, “Anda kesulitan berjalan selama 15 menit tanpa berhenti, (You have difficulty walking for 15 min without stopping).” The original sentence meant the subject is not able to walk continuously for 15 min, this may produce a misunderstanding according to Indonesian language and culture that the respondents are not able to walk continuously due to any hindrance regardless of the relation to cause. The expert panel suggested that the sentence changed into “Anda kesulitan berjalan selama 15 menit tanpa berhenti, (You have difficulty walking for 15 min without stopping),” to build the subject’s awareness of the disability of whether he/she needs to make occasional stops when walking for 15 min due to the impairment.

The third notable addition was made to the seventh item: “You cannot get across the road at a crossing before the traffic light changes,” translated as, “Di tempat penyebrangan, Anda tidak mampu mencapai seberang jalan sebelum lampu lalu lintas berganti warna (You cannot cross the road at the crossing before the traffic light changes color).” A color change phrase was added to the question to accommodate the usual form of the traffic light-related expression used in Indonesia. The adherence to traffic rules in Indonesia is different from that in Japan. Indonesians showed a lower adherence to traffic rules as revealed by several incidences of driving through red light, ignoring speed limits, and many other traffic violations [27]. Regularjaywalking revealed a poor understanding of the rules by pedestrians [28]. These issues may prompt the creation of a modified screening tool for locomotive syndrome that is based on the original loco-check but is better suited to the Indonesian culture and habits.

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The final trial consisted of testing the validity and reliability of the pre final form of the translated loco-check. The data were obtained from 30 community-dwelling geriatrics. The results indicated a strong correlation between the pre-final Indonesian loco-check and the standard loco-check with $r = 0.981$ ($p < 0.001$), revealing a good validity for the Indonesian loco-check having the same association as the original version.

This study was meant to be the first step in unveiling a relatively unknown problem in Indonesia. This is the first study on locomotive syndrome in Indonesia and also the first cross cultural adaptation study of the loco-check questionnaire. This study was meant to be a continuation study for revealing the evidence of locomotive syndrome in Indonesia, planned to be followed by further locomotive syndrome observation study in Indonesia, and then with a randomized controlled trial study of LOCOMO training exercise.

This study has several limitations. The tool was tested on a maximum of 30 participants in the final stage testing, it should be tested on a bigger sample size. We did not evaluate the correlation between the receptiveness of the patients and their cognitive function, educational background, and ethnicity. We also did not evaluate the correlation between this tool and other tools used for mobility assessment. The validity and reliability of this questionnaire were good, but it cannot be firmly concluded that this Indonesian version of the loco-check can be used to monitor improvements, as it was beyond the scope of this study.

5. Conclusion

The Indonesian version of the loco-check has good validity and reliability and could be used as a general questionnaire to screen for locomotive syndrome. From this study we concluded that the Indonesian version of the loco-check can be applied to patients who have a pathology of the locomotive organs.

Declaration of competing interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

Acknowledgment

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References