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Original Article

The Indonesian version of the Premature Infant Pain Profile–Revised: Translation and adaptation of a neonatal pain assessment

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ABSTRACT

Purpose: Pain assessment is a key component of good pain management in hospitalized infants. This study aimed to translate and adapt a version of pain measurement in infants, the Premature Infant Pain Profile Revised (PIPP-R) into Indonesian.
Method: The adaptation process of the measuring instrument used a modified Brislin method which included forward translation, back translation 1, group discussion 1, back translation 2, group discussion 2, and pilot testing on neonatal nurses: feasibility test, inter-rater reliability using intraclass correlation (ICC), and internal consistency using Cronbach's α coefficient.
Results: The PIPP-R version in English has been translated into Indonesian. In general, nurses assessed this measuring instrument as feasible. The inter-rater reliability showed a high agreement (ICC = 0.968, $P = 0.001$) and this measuring instrument had good internal consistency (Cronbach's $\alpha = 0.856$).
Conclusion: The Indonesian version of PIPP-R is easy to use and shows good psychometric properties. The use of this measuring instrument will help nurses and researchers obtain accurate infant pain intensity measurement values.
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What is known ?

- The Premature Infant Pain Profile –Revised (PIPP-R) is a neonatal pain assessment that has good validity, reliability, and feasibility.
- The original PIPP-R is in English and it has been translated formally to four Nordic (Finnish, Icelandic, Norwegian, and Swedish languages).

What is new ?

- It is the first study in translating the PIPP-R formally to Indonesian.
- A reliable and feasible PIPP-R in Indonesian version is provided. It can be a reference in research purpose and clinical bedside.

1. Introduction

Pain management in neonates is an integral part of modern neonatal intensive care. The purpose of neonatal pain management is to minimize pain experience and the physiological effects [1]. Pain assessment is a key component of good pain management in hospitalized infants [2]. The need for measuring instruments in assessing pain in neonates is also a clinically important issue because it will be the basis for determining therapeutic decisions and evaluating the effectiveness of a pain intervention [3]. Assessment or evaluation of neonatal pain is complex and quite difficult because pain is a subjective phenomenon while neonates cannot verbalize their subjective phenomenon yet [4,5]. Therefore, in assessing pain in neonates the emphasis is on objective elements such as behavioral and physiological aspects. The evaluation of behavioral and physiological aspects has the consequence that the best pain measurement tool for neonates is one that has a multi-dimensional model.

There is no gold standard for the neonatal pain measurement in current medical services [6,7], however the Joint Commission on Accreditation of Health Care (JCAHO) recommends choosing a valid

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measuring instrument, reliable and in accordance with age; and at present, more emphasis is on the description of physical function due to pain [8,9]. The multidimensional scale of pain assessment in neonates that is most studied are Neonatal Infant Pain scale (NIPS), Premature Infant Pain Profile (PIPP) and Neonatal Facial Coding System (NFCS) [10]. Among the three measuring instruments, PIPP is more detailed in measuring physiological aspects. A systematic review of 62 studies using PIPP shows that it is a valid measurement for determining the efficacy of an intervention to reduce pain in preterm and term infants [11]. However, the PIPP has less validation if applied to premature babies born <28 weeks or known as extreme low gestational age (ELGA). In connection with this problem and to further consider issues of validity and reliability in all gestational age groups, the PIPP has been revised to the Premature Infant Pain Profile-Revised (PIPP-R) [12]. Based on this current revision, PIPP-R needs to be carefully considered to be used as a measure of pain in a study and also used in both clinical and bedside settings.

In Indonesia, it is very rare to find any research using PIPP-R to assess neonatal pain response, as well as its use in health care settings. Therefore, we needed a measuring tool that is accurate, reliable, and easy to understand so that it can be done in accordance with existing settings or cultures. PIPP-R is a good measurement tool to be chosen if a very objective picture of pain is needed because it fully assesses behavioral and physiological aspects taking into account the factors of gestational age. An instrument needs to be translated, adapted and validated before being used in research or health services. There have been no reports of the formal PIPP-R translation process into Indonesian. This study aimed to translate and adapt PIPP-R content into Indonesian through standardized steps.

2. Materials and methods

2.1. Original PIPP-R instrument

PIPP-R includes 3 indicators, namely indicators of behavior (including aspects of brow bulge, eye squeeze, and nasolabial furrow), physiological indicators (including oxygen saturation and heart rate) and contextual factors (including gestational age and behavior conditions). In PIPP-R, the individual item scores and total scores are modified to show how gestational age (GA) and behavioral state (BS) are hypothesized to influence physiological and behavioral variables. In PIPP-R, a new contextual indicator is given a value if the other indicators show a value of more than 0. If the baby gets oxygen, the oxygen saturation score is given as a maximum value. Behavior indicators are seen from the duration of time. In this study, the original English version of the PIPP-R was translated into Indonesian and the linguistic validation was performed on the Indonesian version.

2.2. Permission for the translation and acquisition of the English version of the PIPP-R

The researchers obtained permission from the author of the original PIPP-R to translate the PIPP-R into the Indonesian version.

2.3. Ethics committee approval

This study was approved by Medical and Health Research Ethics Committee (MHREC) Faculty of Medicine, Universitas Gadjah Mada-Dr. Sardjito General Hospital (Ref: KE/FK/1193/EC/2017).

2.4. Methods

The research aimed to validate the Indonesian translation of the PIPP-R instrument. To get accurate translation and adaptation results, the translation process used adaptations from the Brislin method [13–15] and modified by the World Health Organization [16] in terms of the criteria for the bilingual expert. The adapted Brislin method is often used and accepted as an effective method for obtaining equivalent translation results of instruments. Fig. 1 summarizes the flow of steps in the Brislin modification method. This method included:

a. Two independent translations which were simultaneously made from the source language to the target language (TL) by two bilingual experts;
b. Each TL version was back translated (BT) blindly into the source language by two new bilingual experts;
c. A group discussion conducted by translators and professionals in the field of health to review translation results, back translation, identify differences in meanings, and adapt the target language version to achieve equivalent, and culturally accurate meanings, to produce a new TL version;
d. The new TL version was independently translated again by two other bilingual experts;
e. The second group discussion was conducted to review the results of the new back translation and compare it with the original English version;
f. If an error in meaning occurred after comparing the BT to the original version, then the translation process was repeated again especially concerning the error. In this study, the process was considered sufficient with these steps because the equivalent and culturally accurate meanings had been obtained by consensus;
g. Conducting a pilot study.

2.4.1. Forward translation

Two translators separately translated the English version of PIPP-R into the Indonesian version. The two forward translators are native speakers of Indonesian and are fluent in English. One person is a certified translator and the other person lives in the Netherlands, previously mastering English. At this stage 2 sets of translation were produced (TL 1 and TL 2).

2.4.2. Back translation

Two bilingual translators who did not know the original English version of the PIPP-R instrument performed a back translation into English. The two translators are English native speakers, one each from the UK and Australia. They live in Indonesia and teach in official English institutions. At this stage there were 2 sets of back translation (BT 1 and BT 2).

2.4.3. Group discussion

The group discussion was conducted by comparing PIPP-R between the original version, the results of 2 forward translations (TL 1 and TL 2) and 2 back translations (BT 1 and BT 2) with the objectives of: 1) ensuring clarity, readability and linguistic suitability; 2) examining the grammatical and comprehensibility aspects, and 3) looking at cultural equivalence.

From this discussion, the differences in meanings or errors that could be found were identified. This group discussion involved translators and professionals in the health sector who were all bilingual consisting of a nurse (with PhD) who has lived in New Zealand, a doctor, a pediatric nurse, and a neonatal nurse.

Based on the discussion, it was agreed that there were no errors

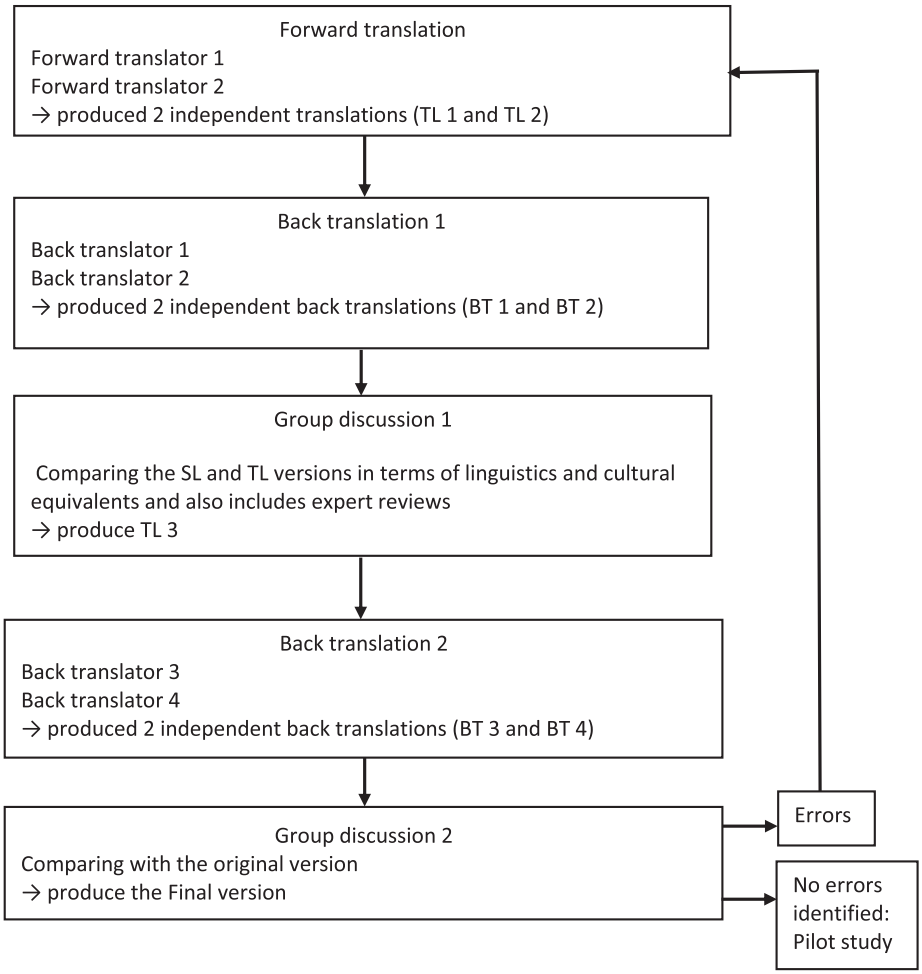

Fig. 1. Flow of steps in the Brislin modification method for translating the Premature Infant Pain Profile-Revised.

or significant differences in meaning. However, differences in word choice were found which were culturally and commonly considered inappropriate to be used in the clinic. Therefore, in this discussion a new Indonesian version of the PIPP-R was formulated (TL 3). The word selection was done based on the accuracy and commonness of terms used in the health profession. To achieve better cultural accuracy and equivalence, the Indonesian version of PIPP-R (TL 3) was then back translated again.

2.4.4. Back translation 2

The Indonesian PIPP-R (TL 3) was back translated into English by two bilingual translators who were different from the previous back translators and also had never known the original English version of the PIPP-R instrument. These translators consisted of 2 native Indonesians living in the UK and Australia. At this stage, the process produced 2 sets of back translation (BT 3 and BT 4).

2.4.5. Group discussion 2

Comparing BT 3 and BT 4 with the original version of source language (SL), the results showed relatively similar word choices with the SL and more consistent language equivalents. At this stage there was also proofreading on TL 3. Proofreading was done by Indonesian linguists to check spelling, grammar, formatting errors, and the final Indonesian version of PIPP-R (TL 4) was produced. Since no errors or differences in meaning were found, and the word choice was culturally equivalent, the translation process was considered sufficient until this discussion and no re-translation was performed again. This discussion was conducted by the first author, two back translators (BT 3 and BT4), Indonesian linguists and a neonatal nurse.

2.4.6. Pilot study

Adequate pain assessment using the right tool validation, both in the population and the individual, is a prerequisite for the success of pain management [17]. This pilot study was part of an effort to adapt measuring instruments in Indonesian in order to produce accurate measuring instruments. Since the terms used in the original instrument were objective and clear indicators, as well as the limited number of bilingual nurses, a pilot testing was conducted on monolingual nurses in the neonatology room of a government hospital. At this stage, 3 measurements were done, namely inter-rater reliability, internal consistency and test feasibility.

In order to estimate inter-rater reliability, 3 nurses were involved to assess the same 30 neonates during invasive measures (infusion and blood collection) using the Indonesian version of PIPP-R. To measure internal consistency, 25 nurses were involved to assess the intensity of pain using the Indonesian version of PIPP-R in 30 neonates whose blood were drawn. Sample size for reliability test with minimal 30 can be a robust estimator of the population coefficient α [18,19]. Measuring feasibility involved 25 nurses who had been trained using PIPP-R to fill out the test in the form of a

modified Likert scale [2] for feasibility surveys [20]. The Likert scale consisted of 4 items with 5-point rating scale where the value 1 indicated low feasibility and score 5 indicated very high feasibility. The item content included ease of use, ease of giving scores, time spent, and clarity of instructions.

2.4.7. Statistical analysis

The data in the pilot study consisted of three different data sets. The first data set was used to assess inter-rater reliability, and the second data set to assess internal consistency. The third data set was used to assess the feasibility of data processed using Excel. The estimated inter-rater reliability used the intraclass correlation (ICC) coefficient. The Cronbach's α reliability was used to measure the internal consistency. The mean value was used to assess feasibility. The process of analyzing data used SPSS version 22 (IBM Corp., 2013).

3. Results

3.1. Development of interim version

Basically, no difficulties were encountered in translating this PIPP-R tool, because the terms used included definite technical aspects, measuring objective parameters that were very clear and did not contain psychosocial phenomena. Some differences in word choice, especially in the behavioral domain, were encountered during the translation process. The words chosen by the translators varied according to the rules of Indonesian language, where there were also those who used everyday language that were inappropriate when viewed from the standard Indonesian grammar. However, all selected words had the same meaning. Therefore, the accurate choice of words was a topic in the group discussion. The authors decided to determine the best translation in Indonesian by paying attention to semantic similarities, grammar, and common usage in daily practice in clinics (Table 1).

The term "brow bulge" in the behavior domain was translated to 'mengernyitkan alis' and 'tonjolan alis'. In the discussion, guidelines for implementing the PIPP-R examination were reviewed. The intended brow bulge is the response of the baby by showing vertical groove protrusions above and between the eyebrows that occur as a result of decreased eyebrow pulling. Then in terms of grammar, 'brow bulge' is a noun not a verb. Thus, the word 'tonjolan alis' was selected according to the PIPP-R guide description. They also discussed the term 'eye squeeze' in the domain of behavior. The translations were 'memejamkan mata' and 'remasan mata'. Based on the PIPP-R examination guide, it mentioned that 'eye squeeze' was identified with a picture of a squeeze or a fat bearing protrusion around the eyelid. The term 'memejamkan mata' did not describe the bulge of fat pads around the eyes. In addition, the term 'remasan' was also considered too general to be used, while the specific term for the eye is 'kernyitan'. Thus, 'eye squeeze' as a noun was defined as 'kernyitan mata'.

Table 1
Discrepancy presented in the PIPP-R translation for the Indonesian and the agreed consensus.

Original term	Translation discrepancy	Consensus
Brow bulge	Mengernyitkan alis Tonjolan alis	Tonjolan alis
Eye squeeze	Memejamkan mata Remasan mata	Kernyitan mata
Nasolabial furrow	Pengerutan pada nasolabial Alur nasolabial	Kerutan nasolabial
Awake	Sadar Bangun Terjaga	Terjaga
State	Keadaan Kondisi Status	Status

The two forward translators translated 'nasolabial furrow' with 'pengerutan pada nasolabial' and 'alur nasolabial'. The term 'nasolabial' was difficult to translate into Indonesian efficiently, so the term nasolabial was still used. The term 'alur' was replaced by 'kerutan' to describe the result of the pulling process which was seen as a fold or wrinkle between the nose, cheeks, and lips.

The term 'awake' in the item 'active and awake' was translated as 'sadar', 'bangun' and 'terjaga'. The preference was for the term 'terjaga', because it described the condition of someone who was awake, could open his/her eyes without having to do any activities, which was almost the same as the term 'wake-up'. Whereas the word 'bangun' could mean 'get up', which was opening the eyes and accompanied by movements such as sitting or standing. Since it was in the context of babies, thus what is chosen for the term 'awake' is 'terjaga'.

The word 'state' in the 'behavioral state' item was translated as a 'keadaan', 'kondisi' and 'status'. In Indonesian, the three words have very similar meanings. Since the original word 'state' was different from the word 'condition', and it was also common in the field to use the word 'status' in describing a state of health, thus the word 'status' was chosen to translate the word 'state'. The word 'tenang' on TL 1 and TL 2 was translated as 'relax', and as 'calm' at BT 3 and BT4. The different meanings between the words 'quiet', 'relax' and 'calm' were also discussed.

The ICC scores indicated a very high agreement between raters (ICC = 0.968, $P = 0.001$). The Cronbach's α coefficient ≥0.6 was agreed to estimate the internal consistency of an instrument. The Cronbach's α coefficient for PIPP-R in this study ($\alpha = 0.856$) showed good internal consistency. The mean score for each feasibility item ranged from 2.083 to 3.830 (*median* 2–4 of 5). The lowest value was in the ease of using PIPP-R items, indicating that the use of PIPP-R was not easy. Based on discussions with nurses, it turned out that the difficulty in question was the limited tools for measuring oxygen saturation (oximeter). The nurses explained that the PIPP-R was actually easy to do, however it needed a tool to assess oxygen saturation that was not available in the neonatal ward.

3.2. Final version development

The final version of PIPP-R in Indonesian was completed after the discussion with the linguistic validation team and was followed by proofreading spelling, grammar and formatting. The final results are shown in Fig. 2.

4. Discussion

A large variety of validated neonatal pain-assessment tools have been developed. These tools vary in their combination of physiologic and behavioral measures, as well as whether they take gestational age into account [21]. Although more than 40 different neonatal pain assessment tools have been developed [22], only a few are regularly incorporated into use in most neonatal intensive care units. Since no comprehensive data exist on those used most commonly, one must infer this from tools used in published studies of neonatal pain. Commonly used neonatal pain tools are PIPP, CRIES, NIPS, COMFORT, NFCS, NPASS [21]. Only 2 of the aforementioned commonly used pain scales (PIPP and N-PASS) have a metric adjustment to account for prematurity; however, other scales have demonstrated validity and reliability in the premature population. PIPP has been revised to PIPP-R and it has demonstrated validity and reliability in the premature and mature population as well.

Indiktator Bayi	Skor indikator				Skor Indiktor Bayi
	0	+ 1	+ 2	+ 3	
Perubahan denyut Jantung (kali per menit) Data awal: _____	0 – 4	5 – 14	15 – 24	>24	
Penurunan Saturasi Oksigen (%) Data awal :_____	0 – 2	3 – 5	6 – 8	>8 atau Peningkatan O_2	
Tonjolan Alis (detik)	Tidak Ada (<3)	Minimal (3 – 10)	Sedang (11 – 20)	Maksimal (>20)	
Kernyitan Mata (detik)	Tidak Ada (<3)	Minimal (3 – 10)	Sedang (11 – 20)	Maksimal (>20)	
Kerutan Naso-Labial (detik)	Tidak Ada (<3)	Minimal (3 – 10)	Sedang (11 – 20)	Maksimal (>20)	
Skor Sub-Total					
Usia Kehamilan (UK) (Minggu+Hari)	>36 mgg	32 mgg-35 mgg, 6hr	28 mgg-31mgg, 6 hr	< 28 mgg	
Data awal Status Perilaku (SP)	Aktif dan Terjaga	Tenang dan Terjaga	Aktif dan Tidur	Tenang dan Tidur	
Skor Total					

Fig. 2. The Premature Infant Pain Profile-Revised Indonesian version (Profil Nyeri Bayi Prematur – Revisi).

The current research translated, culturally adapted and pilot tested the PIPP-R in the Indonesian version. This effort was performed as a formal process to translate the measuring instrument that would be used in the research. The PIPP-R was chosen as a pain measurement tool in neonates for 3 reasons. Firstly, the PIPP-R is a multidimensional pain assessment that includes comprehensive behavioral and physiological aspects so that it can measure pain more objectively than uni-dimensional types. Secondly, the PIPP-R considers the gestational age of the baby specifically, so that it can be applied to various age characteristics of the baby accurately. Thirdly, the item indicators and score indicators are objective, so there is very little possibility of multiple perceptions between assessors and will be accurate for use in the interests of neonatal research and services in hospitals.

There was no significant difficulty in the translation process of PIPP-R from English to Indonesian, because the pain indicator items were objective and definite, for example heart rate values, saturation, and gestational age. The behavioral status item showed the choice of different words in Indonesian by the translators, but with group discussions and reviews of Indonesian linguists who were also bilingual, the terms used were agreed upon. At the time of the pilot study, the application of aspects of behavioral status was initially poorly understood due to the intent and criteria were not explained yet, but when the criteria between active and quiet, and between awake and asleep were explained, the nurses understood it very easily.

In the behavioral aspects (brow bulge, eye squeeze and naso-labial furrow), the terms were varied, but still contained the same meaning. The difference was more in the application of the grammar and personal language style of the translator. For example, a noun in English was translated into the form of a verb, and vice versa. After the team discussed this issue in the discussion group and also referring to the Indonesian dictionary, an agreement was reached on the chosen word.

In general, translating this measuring instrument was not difficult but it required accuracy. The accuracy in question includes accuracy in terms of standard grammar, caution considering cultural problems, and assessing the prevalence of terms used in medical science. Thus, words that are accurate, standard and also commonly used in the health sector were appropriately chosen.

In this study the English version of PIPP-R has been translated into Indonesian and has been tested by nurses when assessing neonatal pain scale performed on invasive procedures. The final version in Indonesian has been confirmed conceptually equivalent to the original English version. Pilot testing to nurses shows consistent results between raters, while the internal consistency of instruments also shows good results. Nurses generally consider it easy to do pain assessment using PIPP-R but they need some explanation at the beginning of the introduction. A further study is important to measure the psychometrics with more nurse samples and involving Indonesian/English bilingual nurses.

Author contribution

SYRF: developed and original idea, wrote the manuscript in consultation with LL and MJ.

LL: study design, analysis, co writer of the manuscript.

MJ: critical revision of the manuscript, supervised the work.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijnss.2019.06.010.

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