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ASSESSMENT PROCEDURE

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Translation, cross-cultural adaptation, and psychometric analysis of the Indonesian version of the American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form (ASES), patient self-report section

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ABSTRACT

Purpose: To translate the American Shoulder and Elbow Surgeon (ASES) score into Indonesian and to assess its psychometric properties.

Materials and methods: The ASES score was translated into Indonesian following the Consensus-based Standards for the selection of health Measurement Instruments (COSMIN) guidelines. Next, the validity and reliability of the Indonesia-ASES (I-ASES) were investigated. Patients with shoulder problems at a hospital in Indonesia who were willing to participate completed three questionnaires: the I-ASES, the Medical Outcomes Study 12-Item Short-Form Health Survey (SF-12), and the Shoulder Pain and Disability Index (SPADI). Participants were asked to complete the I-ASES a second time after a one-week interval. In adherence to COSMIN guidelines, we assessed construct validity using hypothesis testing, test–retest reliability, internal consistency, floor and ceiling effects, and measurement error. The Bland–Altman method was used to evaluate systematic bias.

Results: The I-ASES showed good construct validity. No floor or ceiling effects were found. An ICC value of 0.82 was found, indicating a robust level of test–retest reliability. A Cronbach α of 0.90 implied good internal consistency. Bland and Altman analysis showed no systematic bias. The standard error of measurement (SEM), the minimal detectable change at the individual level (MDC_{ind}) and at the group level (MDC_{grp}) were 2.3, 6.5, and 0.6, respectively.

Conclusions: The I-ASES shows good validity and reliability for evaluating shoulder problems in Indonesian-speaking patients and reveals comparable psychometric properties to those of the other languages version of ASES.

> IMPLICATIONS FOR REHABILITATION

- The Indonesian version of the American Shoulder and Elbow Surgeons standardized Shoulder Assessment Form (I-ASES) is now available.
- I-ASES demonstrated satisfactory reliability and validity.
- I-ASES can be considered a valid and reliable questionnaire for use in Indonesian patients with shoulder problem.

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Translations; self-report; surveys and questionnaires; patient-reported measures; shoulder pain

Introduction

Outcome assessment of orthopedic procedures has changed remarkably over the last decades. Physician-reported outcome measurements are no longer viewed as the only way to evaluate treatment outcomes; subjective patient-reported outcome measures (PROMs) provide additional and very valuable information. The driving force behind this paradigm shift originated from the inherent bias of clinician assessment and how this method tended to marginalize patients' perceptions of their outcomes [1].

The American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form (ASES) score is a widely used PROM in the functional assessment of shoulder pathology. It is often used in the postoperative evaluation of rotator cuff disease, acromioclavicular joint surgery, shoulder instability, and osteoarthritis of the shoulder joint [2]. The Society of American Shoulder and Elbow Surgeons created the ASES score in 1994 to facilitate standardization of outcome measures and promote multi-center trials in shoulder and elbow surgery [3]. Subsequently, the ASES has been embraced and extensively adopted within the scientific community and become one of the most widely used tools for evaluating shoulder function [4]. The ASES is a sophisticated measure for both the patient and the examiner, offering a relatively varied number of items to be measured [5]. The ASES score exhibited one of the lowest absolute measurement errors when compared to other scores and was advised

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as a tool for outcome measures for all patients with shoulder problems [5,6]. The ASES score is attributed to its comprehensive evaluation approach, strong reliability and validity, flexibility across various patient populations, and predictive value for outcomes. Compared to other tools, its combination of patient-reported and clinical-evaluated measures provides a more complete assessment of shoulder dysfunction [6]. The ASES was initially developed in English. For use in other languages and cultural settings, the score should be translated into the new target language adapted to the new cultural characteristics, and its psychometric properties should be assessed.

This study aimed to translate and adapt the English version of the ASES score cross-culturally into an Indonesian version (I-ASES) and test its validity and reliability for individuals with shoulder problems. We hypothesized that the I-ASES would be valid and reliable for use in the Indonesian-speaking population.

Materials and methods

The study protocol received approval from an Institutional Review Board (B-089-1/UN19.5.1.1.8/UEPKK/2021), and participants provided written informed consent before participating in the study.

Translation procedure

The translation of I-ASES adheres to the forward and backward translation guidelines originally proposed by Guillemin, Beaton and coworker [7]. The procedure comprises five primary stages: initial translation, translation synthesis, back translation, committee review, and pretesting of the translated version. Subsequently, all written reports were submitted and evaluated for the expert committee review to finalize the translated score's end version. Two independent Indonesians with good English language skills initially completed the conceptual and literal translation of ASES into Indonesian (T1 and T2). Based on feedback from the two original translations, the subsequent synthesized version (T12) was generated. Then, this version was translated back into English by two independent professional translators (BT1 and BT2) to check for inconsistencies with the original English version. An expert committee comprising three sports medicine orthopedic surgeons, one methodologist, and one translator was formed to review this Indonesian translation. Following the committee's review, one of the authors (R.D.) edited the questionnaire to produce a pre-final version. These pre-final translated versions were then distributed to 10 patients with shoulder problems. One researcher (R.D.) documented difficulties experienced by the patients when completing the questionnaire. Documentation was reviewed by the expert committee and used to modify the questionnaire into the final version of the I-ASES.

Patients and procedure

A total of 100 consecutive patients who visited a hospital in Indonesia between July 2022 and June 2023 were asked to participate in this study. All participants were Indonesian-speaking patients visiting the hospital for shoulder problems. To be eligible for this study, participants must be native Indonesian speakers, possess a shoulder problem confirmed by an orthopedic surgeon with over five years of experience in the area, and have received treatment for shoulder pain in a hospital setting. Patients were given information about the study and a first set of questionnaires (part A) to be filled out at the outpatient clinic. Then, the patients were asked to return after one week and fill out a second set of questionnaires (part B).

Part A comprised the I-ASES and two complementary questionnaires, the Medical Outcomes Study 12-Item Short-Form Health Survey (SF-12) and the Shoulder Pain and Disability Index (SPADI). Part B consisted of the I-ASES and to determine whether health status and shoulder function remained stable between the completion of parts A and B, patients were provided at the start of the part B questionnaire with a single Global Rating of Change (GRC) question: "Has your shoulder symptom changed since filling out the initial questionnaire?". The three possible responses were (1) no; (2) yes, the problem changed for the better; and (3) yes, the problem changed for the worse. Patients included in the test–retest analysis were only those reporting no change in their shoulder symptoms. Data from patients who completed part B more than one month later than part A is excluded from the test–retest reliability analysis.

Patient-reported outcome measures

The ASES scale comprises 11 components and is divided into two sections [3]. The initial section, focusing on pain, assesses the patient's pain level on a 10-cm visual analog scale. The scale ranges from a minimum of 0 as "no pain at all" to a maximum of 10 as "pain as bad as it can be." The second section, related to functionality, consists of 10 questions assessing the ability to perform various daily activities. These activities range from simple tasks like putting on a coat to more challenging ones, like throwing a ball overhead or lifting a 10-lb object. Answers follow the four-point Likert scale from 0 "unable to do" to 3 "not difficult." This section is scored on a scale ranging from 0 to 50 points. The total ASES score ranges from 0 to 100 points [3,5].

The SF-12 is a generic score used to establish a health profile [8]. It consists of eight scaled scores, where each subscale is directly transformed into a scale from 0 to 100 to identify the patient's physical and mental state: physical functioning (PF), physical role functioning (PR), bodily pain (BP), general health perceptions (GH), vitality (VT), social function (SF), emotional role functioning (ER), and mental health (MH). In addition, the sum of the PF, PR, BP, and GHs subscales generates a physical component summary score (PCS), and the sum of the VT, SF, ER, and MH subscales generates a mental component summary score (MCS). Standardized scores range from 0 to 100, with higher scores indicating better health status. The Indonesian-validated version of SF-12 was used [9].

The SPADI is a 13-item shoulder-specific PROM [5]. It consists of two subscales: a five-item subscale of pain representing pain severity in the last week and an eight-item disability subscale representing shoulder function in activities of daily living. The total score ranges from 0 to 100, with the higher score representing higher pain intensity and disability [5]. We translated the SPADI into Indonesian following international guidelines.

Validity

Validity refers to the degree to which a score accurately measures what it is intended to measure: that is, whether it has the intended interpretation. The construct validity of the I-ASES was evaluated by establishing the correlation of the I-ASES score with the score on the PCS, MCS, and SPADI. In accordance with the Consensus-based Standards for the selection of health Measurement Instruments (COSMIN) guidelines, predefined hypotheses were formulated regarding the expected magnitude of the associations between the I-ASES and the PCS, MCS, and SPADI [10]. Since SF-12 with both components – PCS and MCS – is a generic questionnaire, and both I-ASES and SPADI are shoulder-specific questionnaires, we hypothesized that the I-ASES would show a lower

correlation with the PCS and MCS than the SPADI. The Finish version of ASES showed correlations between the ASES score and the PCS and MCS of 0.57 and 0.21 [11]. Based on this, it was hypothesized to find correlations lower than 0.6 between the I-ASES and the PCS and a correlation lower than 0.3 between the I-ASES and the MCS. The I-ASES was designed primarily to assess PF as opposed to social or emotional aspects. Consequently, stronger correlations were anticipated between the I-ASES and the PCS compared to those between the I-ASES and the MCS. Next, the correlation between the Turkish version of ASES and the SPADI was 0.82 in a previous study [12]. Based on the correlations found in that study, correlations of 0.6 or higher between the I-ASES and the SPADI were hypothesized. Good construct validity is indicated when a minimum of 75% of these predefined hypotheses are verified [13].

Floor and ceiling effects

The occurrence of floor and ceiling effects was assessed. These effects are considered to be present if more than 15% of respondents achieve the lowest or highest possible score [13].

Reliability

Reliability refers to the degree to which individuals can be differentiated from each other, even in the presence of measurement errors. Following the COSMIN guidelines, reliability was evaluated in terms of internal consistency, test–retest reliability, and measurement error. Internal consistency pertains to the degree of relatedness among subscales within a questionnaire, while test–retest reliability focuses on the consistency of patients' scores across repeated measurements. Measurement error quantifies the systematic error of a patient's score that is not attributable to actual changes in the measured construct. The Bland–Altman method was employed to examine the absolute agreement, reflecting the limit of agreement between repeated measurements [14].

Statistical analysis

The study population characteristics and scores on the questionnaires are depicted using means and standard deviations (SDs), or frequencies and percentages. The Spearman rho correlation coefficients were calculated between the scores on the I-ASES and the other questionnaires to determine construct validity. The Spearman rho values were interpreted as high ($\rho > 0.6$), moderate ($0.6 < \rho < 0.3$), or low ($\rho < 0.3$) [15]. Cronbach's α was calculated to determine internal consistency. Values between 0.70 and 0.95 indicate good internal consistency [13].

The intraclass correlation coefficient (ICC) between test and retest I-ASES scores was calculated to determine test–retest reliability. Values <0.5, 0.5–0.75, 0.75–0.9, and >0.90 suggest poor, moderate, good, and excellent reliability, respectively [16]. Standard error of measurement (SEM) and minimal detectable change (MDC) were calculated to evaluate measurement error. SEM was calculated by multiplying the pooled SD by $\sqrt{(1 - r)}$, where r is the ICC. The MDC at the individual level (MDC_{ind}) was calculated using the formula $1.96 \times SEM \times \sqrt{2}$ and at the group level (MDC_{grp}) by dividing MDC_{ind} by $\sqrt{n}$, where n is the number of samples [13].

Bland–Altman's plots were utilized to assess absolute reliability; no systematic bias is present when 0 is in the 95% confidence interval (CI) of the mean difference between the first and second administration of the I-ASES. The 95% limits of agreement (LOA) were determined with the formula mean difference $\pm 1.96 \times SD_{diff}$, where SD_{diff} is the SD of the mean difference between the first and second administration of the I-ASES [15]. Statistical analyses were conducted using SPSS Statistics version 26.0 (IBM, Armonk, NY), with a level of significance set at 5%.

Results

Patient characteristics

Of the 100 patients, 92 patients (92%) filled in two complete sets of questionnaires. The remaining eight patients (8%) filled in only part A. Data of five patients (5%) were excluded as they reported better shoulder function when they filled out part B. No patients were excluded due to missing data. Data from 100 patients could be used to test validity and internal consistency. Additionally, data from 87 patients, representing 87% of the total, are used to determine test–retest reliability. The mean age of the samples was 50.3 ± 12.9 years, with an educational level of most of the patients who graduated from high school. The flowchart of the population selection is described in Figure 1. The details of the demographic characteristics of the patients are provided in Table 1. The mean scores of the first and second assessments of the I-ASES were 49.4 ± 16.3 and 51.5 ± 2.1, respectively. Scores on all the PROMs can be found in Table 2.

Validity

Of the six predefined hypotheses on the magnitude of associations between the I-ASES and either the PCS, MCS, or SPADI, all of the hypotheses were confirmed. The I-ASES showed a moderate correlation with the PCS ($\rho = 0.30$, $p < 0.05$), a low correlation with MCS ($\rho = 0.03$, $p < 0.05$), and a strong correlation with the SPADI ($\rho = 0.78$, $p < 0.05$). As expected, the I-ASES showed a lower correlation with the PCS and MCS than with SPADI, and the I-ASES was more strongly related to PCS than to MCS (Table 3). There were no floor nor ceiling effects. No patients achieved scored of 0 or 100, which is the lowest and highest scores of I-ASES.

Internal consistency, test–retest reliability, and measurement error

The Cronbach α was 0.90, indicating good internal consistency. The ICC had a value of 0.82 ($p < 0.001$), and the 95% CI ranged from 0.74 to 0.87. The SEM, MDC_{ind}, and MDC_{grp} were determined to be 2.3, 6.5, and 0.6, respectively. The Bland–Altman approach revealed a mean difference between the test and retest I-ASES score of 1.3 (95% CI, −0.15. to 2.66, 95% LOA, −31.1 to 36.6) (Figure 2). No systematic bias was present because the value of 0 was in the 95% CI of the mean difference between the test and retest scores.

Discussion

The objective of this study was to translate and cross-culturally adapt the ASES into Indonesian and to gain insight into the validity and reliability of this questionnaire in an Indonesian-speaking population with shoulder problems. This study suggests that the I-ASES can be deemed valid and reliable for use in Indonesian-speaking patients.

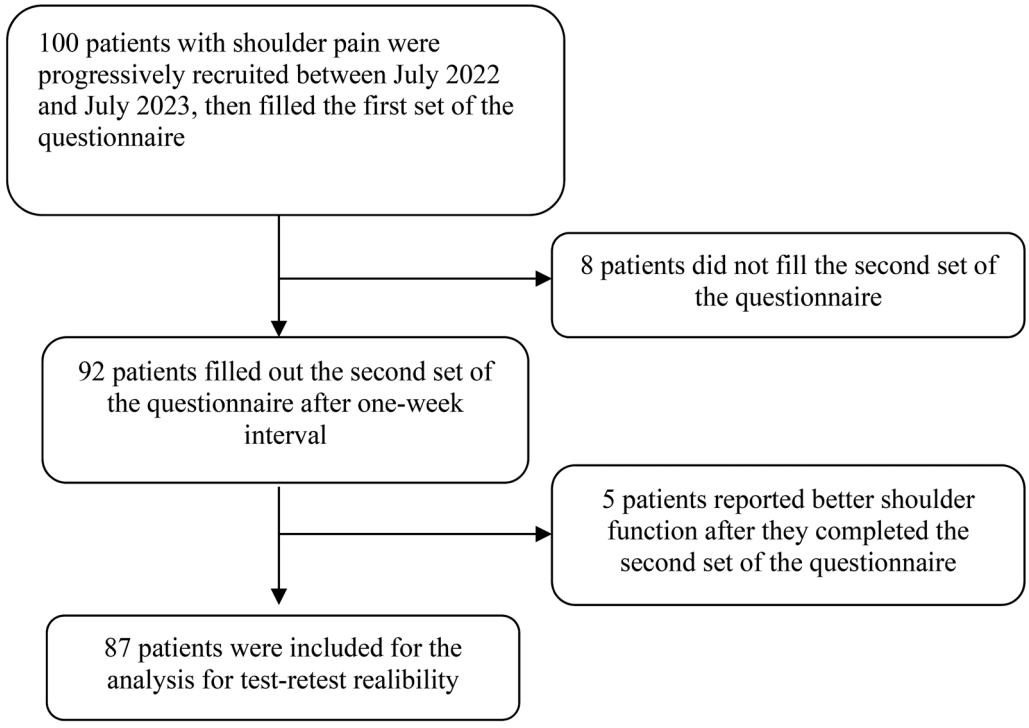

Figure 1. Flow diagram for the population selection in the study.

Table 1. Demographic patient characteristics (N = 100).

Characteristic	Mean ± SD or *n* (%)
Age (years)	50.3 ± 12.9
Sex	
Male	28 (28)
Female	72 (72)
Diagnosis	
Adhesive capsulitis	23 (23)
Rotator cuff tear	68 (68)
Shoulder impingement	9 (9)
Affected site	
Right	59 (59)
Left	41 (41)
Education	
Primary school	1 (1)
Middle school	5 (5)
High school	63 (63)
University	31 (31)

SD: standard deviation.

Table 2. Patient-reported outcome measures.

PROM	Mean ± SD
I-ASES	
Part A	49.4 ± 16.3
Part B	51.5 ± 2.1
SF-12	
PCS	32.7 ± 3.5
MCS	33.8 ± 4.5
SPADI	64.6 ± 17.7

I-ASES: Indonesian version of the American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form; SPADI: the Shoulder Pain and Disability Index; SF-12: Medical Outcomes Study 12-Item Short-Form Health Survey; PCS: physical component summary score; MCS: mental component summary score.

Table 3. Spearman's rho correlation coefficients between I-ASES, SPADI, PCS, and MCS.

	Correlation	Hypothesized	Found (p < 0.05)
1	I-ASES and PCS	<0.6	0.30
2	I-ASES and MCS	<0.3	0.03
3	I-ASES and SPADI	>0.6	0.78
4	I-ASES and SPADI correlation stronger than between I-ASES and PCS		0.78:0.30
5	I-ASES and SPADI correlation stronger than between I-ASES and MCS		0.78:0.03
6	I-ASES and PCS correlation stronger than between I-ASES and MCS		0.30:0.03

I-ASES: Indonesian version of the American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form; SPADI: the Shoulder Pain and Disability Index; SF-12: Medical Outcomes Study 12-Item Short-Form Health Survey; PCS: physical component summary score of SF-12; MCS: mental component summary score of SF-12.

The construct validity of the I-ASES can be regarded as good, as over 75% of the predefined hypotheses were confirmed. As hypothesized, I-ASES showed a strong correlation with SPADI (ρ = 0.78). This is comparable with previous studies in Turkish, Arabic, and German versions that showed a good correlation between the ASES and SPADI (ρ = 0.82, 0.79, and 0.92, respectively) [2,12,17]. As hypothesized, I-ASES showed a low correlation with the MCS (ρ = 0.03). This result is in line with previous studies in the English, Italian, and Finnish versions (ρ = 0.11, 0.20, and 0.21, respectively) [11,18,19]. Moreover, the I-ASES was more strongly correlated to the PCS domains than to the MCS domains, again confirming our hypothesis. The I-ASES was designed primarily to assess PF instead of social or emotional aspects. Consequently, stronger correlations were found between the I-ASES and the PCS compared to those between the I-ASES and the MCS.

No floor or ceiling effects were observed – this point out the capability of I-ASES to discriminate the condition among the patients with shoulder problems. Theoretically, a ceiling effect could have occurred, especially in patients with shoulder problems who had taken therapy adequately, but this was not the case in this study. Also, no floor or ceiling effects were found in other

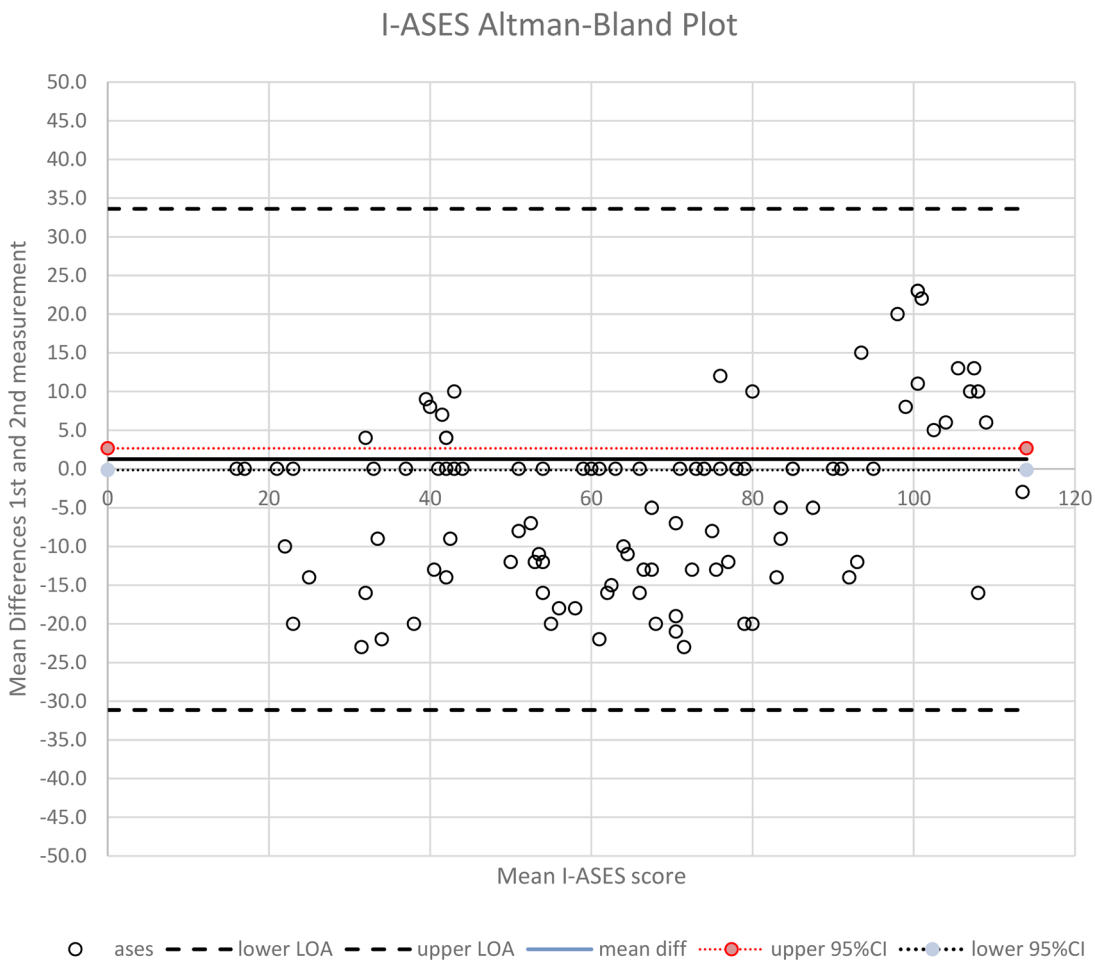

Figure 2. Bland–Altman's plot of the mean difference between the first and second measurements of the Indonesian version of the ASES. In the visual representation, the open circles depict data points, the black line signifies the mean difference, the dotted lines represent the 95% confidence intervals (CIs), and the dashed lines represent the limits of agreement.

languages, like in the Greek version [20]. This result indicates that the content validity of I-ASES is good. Next, the internal consistency of I-ASES can be considered excellent, with a Cronbach alpha of 0.90. This is comparable with the Turkish version (0.88), German (0.96), English (0.94), and Chinese (0.86) [12,17,18,21].

The I-ASES showed good test–retest reliability (ICC, 0.82). This is comparable with the Finnish version (0.83), Italian version (0.91), and German version (0.93) [11,19]. In accordance with COSMIN guidelines, the interval between the test and retest should be sufficiently long to avoid recall bias, yet short enough to ensure that the patients' characteristics relevant to the construct being measured remain unchanged [2]. Based on this result, the period of one-week intervals is possibly adequate to perform test–retest reliability among patients with shoulder problems.

The SEM and MDC of I-ASES were low (SEM, 2.3, MDC_{ind}, 6.5, MDC_{grp}, 0.6). The I-ASES indicated sufficient capability for comparisons at the group level, as only small values are needed to detect change. As only values greater than the SEM can be reliably differentiated from measurement error, a difference should exceed 2.3 to detect a statistically significant change in scores on I-ASES on the group level. The difference between the two measurements should be greater than the MDC_{ind} value in individual patients and SEM so it can be distinguished from measurement error and confirm a real change occurred. Given that the MDC_{ind} is fairly small (6.5), this implies that I-ASES is a suitable tool for monitoring individual patients over time.

Limitations

The study has certain limitations. Some patients did not appear for the second time, but the total number of participants was judged sufficient. Following COSMIN guidelines, at least 100 patients are required to assess validity and 50 patients to examine test–retest reliability [10]. Another potential limitation is that the comparison of the I-ASES was conducted with only one general health-related quality of life questionnaire (SF-12) and one disease-specific questionnaire, the SPADI. Consequently, the number of hypotheses was lower than advised in COSMIN guidelines.

Furthermore, because of the limited availability of the official Indonesian version of the valid questionnaire, we used the self-translated version of SPADI. No information is available concerning the psychometric properties of the Indonesian version of SPADI. However, we performed a translation process following the International guidelines as suggested by Guillemin, Beaton and coworker [7].

Next, future research should explore the responsiveness of I-ASES as well as the minimal clinically important difference (MCID). MCID should be determined to further examine whether a measured difference is also clinically important as perceived by the patient. For the English ASES version, the reported MCID was 6.4 with an effect size of 1.5 [22]. These findings may not directly apply to the Indonesian version; therefore, future research should assess the responsiveness and MCID of the I-ASES. Information

on the responsiveness and capability of I-ASES to detect change over time is required to interpret these scores when used in longitudinal research and clinical practice to monitor Indonesian-speaking patients over time.

Conclusions

The Indonesian ASES shows good validity and reliability for evaluating shoulder problems in Indonesian-speaking patients and reveals comparable psychometric properties to those of the other languages' versions of ASES. This questionnaire enables us to measure patient-perceived symptoms, function, and treatment outcomes in the Indonesian population with shoulder pain.

Acknowledgements

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Ethical approval

This cohort prospective study protocol was approved by the Institutional Review Board of Riau University (B-089-1/UN19.5.1.1.8/UEPKK/2021).

Consent form

Participants provided written informed consent prior to participation.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Data availability statement

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

References

[1] Wylie JD, Beckmann JT, Granger E, et al. Functional outcomes assessment in shoulder surgery. World J Orthop. 2014;5(5):623–633. doi: 10.5312/wjo.v5.i5.623.

[2] Yahia A, Guermazi M, Khmekhem M, et al. Translation into Arabic and validation of the ASES index in assessment of shoulder disabilities. Ann Phys Rehabil Med. 2011;54(2):59–72. doi: 10.1016/j.rehab.2010.12.002.

[3] Richards RR, An KN, Bigliani LU, et al. A standardized method for the assessment of shoulder function. J Shoulder Elbow Surg. 1994;3(6):347–352. doi: 10.1016/S1058-2746(09)80019-0.

[4] Vrotsou K, Cuéllar R, Silió F, et al. Test–retest reliability of the ASES-p shoulder scale. Musculoskelet Sci Pract. 2019;42:134–137. doi: 10.1016/j.msksp.2019.02.004.

[5] Angst F, Schwyzer HK, Aeschlimann A, et al. Measures of adult shoulder function: disabilities of the Arm, Shoulder, and Hand Questionnaire (DASH) and its short version (QuickDASH), Shoulder Pain and Disability Index (SPADI), American Shoulder and Elbow Surgeons (ASES) Society standardized shoulder assessment form, Constant (Murley) Score (CS), Simple Shoulder Test (SST), Oxford Shoulder Score (OSS), Shoulder Disability Questionnaire (SDQ), and Western Ontario Shoulder Instability Index (WOSI). Arthritis Care Res. 2011;63(Suppl. 11):S174–S188. doi: 10.1002/acr.20630.

[6] Baumgarten KM, Chang PS. The American Shoulder and Elbow Surgeons score highly correlates with the Simple Shoulder Test. J Shoulder Elbow Surg. 2021;30(4):707–711. doi: 10.1016/j.jse.2020.07.015.

[7] Beaton DE, Bombardier C, Guillemin F, et al. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine. 2000;25(24):3186–3191. doi: 10.1097/00007632-200012150-00014.

[8] Ware JJr., Kosinski M, Keller SD. A 12-Item Short-Form Health Survey: construction of scales and preliminary tests of reliability and validity. Med Care. 1996;34(3):220–233. doi: 10.1097/00005650-199603000-00003.

[9] Arovah NI, Heesch KC. Assessment of the validity and reliability of the Indonesian version of Short Form 12 (SF-12). J Prev Med Hyg. 2021;62(2):E421–E429. doi: 10.15167/2421-4248/jpmh2021.62.2.1878.

[10] Mokkink LB, Terwee CB, Patrick DL, et al. The COSMIN study reached international consensus on taxonomy, terminology, and definitions of measurement properties for health-related patient-reported outcomes. J Clin Epidemiol. 2010;63(7):737–745. PMID: 20494804. doi: 10.1016/j.jclinepi.2010.02.006.

[11] Piitulainen K, Paloneva J, Ylinen J, et al. Reliability and validity of the Finnish version of the American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form, patient self-report section. BMC Musculoskelet Disord. 2014;15(1):272. doi: 10.1186/1471-2474-15-272.

[12] Celik D, Atalar AC, Demirhan M, et al. Translation, cultural adaptation, validity and reliability of the Turkish ASES questionnaire. Knee Surg Sports Traumatol Arthrosc. 2013;21(9):2184–2189. doi: 10.1007/s00167-012-2183-3.

[13] Terwee CB, Bot SDM, de Boer MR, et al. Quality criteria were proposed for measurement properties of health status questionnaires. J Clin Epidemiol. 2007;60(1):34–42. doi: 10.1016/j.jclinepi.2006.03.012.

[14] Bland JM, Altman DG. Statistical methods for assessing agreement between two methods of clinical measurement. Lancet. 1986;327(8476):307–310. doi: 10.1016/S0140-6736(86)90837-8.

[15] Hinkle DE, Wiersma W, Jurs SG. Applied statistics for the behavioral sciences. 4th ed. Boston (MA): Houghton Mifflin; 1998.

[16] Koo TK, Li MY. A guideline of selecting and reporting intraclass correlation coefficients for reliability research. J Chiropr Med. 2016;15(2):155–163. doi: 10.1016/j.jcm.2016.02.012.

[17] Goldhahn J, Angst F, Drerup S, et al. Lessons learned during the cross-cultural adaptation of the American Shoulder and Elbow Surgeons shoulder form into German. J Shoulder Elbow Surg. 2008;17(2):248–254. doi: 10.1016/j.jse.2007.06.027.

[18] Kocher MS, Horan MP, Briggs KK, et al. Reliability, validity, and responsiveness of the American Shoulder and Elbow Surgeons Subjective Shoulder Scale in patients with shoulder instability, rotator cuff disease, and glenohumeral arthritis. J Bone Joint Surg Am. 2005;87(9):2006–2011. doi: 10.2106/JBJS.C.01624.

[19] Padua R, Padua L, Ceccarelli E, et al. Italian version of ASES Questionnaire for shoulder assessment: cross-cultural adaptation and validation. Musculoskelet Surg. 2010;94(Suppl. 1):S85–S90. doi: 10.1007/s12306-010-0064-9.

[20] Tolis KE, Galanos AA, Fandridis EM, et al. Validity and reliability of the Greek version of the American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form. JSES Int. 2021;5(3):601–607. doi: 10.1016/j.jseint.2020.11.007.

[21] Tie TA, Hong CK, Chua I, et al. The Chinese version of the American shoulder and elbow surgeons standardized shoulder assessment form questionnaire, patient self-report section: a cross-cultural adaptation and validation study. BMC Musculoskelet Disord. 2021;22(1):382. doi: 10.1186/s12891-021-04255-z.

[22] Michener LA, McClure PW, Sennett BJ. American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form, patient self-report section: reliability, validity, and responsiveness. J Shoulder Elbow Surg. 2002;11(6):587–594. doi: 10.1067/mse.2002.127096.