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RESEARCH ARTICLE

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Assessment properties of the Visual Analogue scale, Numeric Rating Scale, Face Pain Scale, and Pain Intensity Subscale of the Brief Pain Inventory in Albanian population with low back pain

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ABSTRACT

Background: Pain intensity is the primary variable assessed in clinical trials for low back pain. A precise assessment of pain intensity is vital for the informed selection of medical and rehabilitation treatments; it represents a notable challenge in clinical settings.

Methods: The four pain intensity scales – Visual Analogue Scale (VAS), Numeric Rating Scale (NRS), Faces Pain Scale (FPS), and Brief Pain Inventory (BPI-IS) – were administered to 200 Albanian participants with low back pain at a regional healthcare center in Albania with a mean age of 69.77 and a standard deviation (SD) of 6.34. The mean of pain duration was 3.51 with a SD of 0.72. Participants were subsequently asked to assess four domains of pain intensity – worst pain, average pain, least pain over the past week, and current pain. The data collection occurred during the patients' initial visits for low back complaints. To assess the convergent validity of the scales – specifically, the relationship between each scale and a composite score of all measures, a principal components analysis was performed.

Results: There were significant correlations among the four scales across all domains of pain intensity in the 200 participants. The screen test from the principal component analyses indicated that the four scales captured a single overarching domain for each of the four pain intensity areas, with the first eigenvalue ranging from 2.33 to 3.63 and the second from 0.16 to 0.43. Moreover, all the scales showed a strong loading on the single component that emerged. The four scales had the highest loading on 'current pain' component (>0.9).

Conclusion: The VAS, NRS, FPS and BPI-IS are valid and can be used for the clinical and research implication in the Albanian population.

Trial registration: The study was registered at clinical trial.gov before the data collection with ID. NCT04131998.

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KEYWORDS
Measurement; pain intensity; validity; Albanian population

Introduction

Low back pain (LBP) is the leading cause of disability globally. It can be measured using a range of self-report scales, observational methods, and/or physiological assessments [1]. Patients with low back pain (LBP) have identified physical functioning, pain alleviation, and quality of life as the most crucial domains to measure [2]. Pain intensity, described as 'the level of discomfort a patient feels, representing the total severity of the pain experience', has emerged as the top-ranked domain among various pain categories in consensus exercises focused on defining core outcome domains for low back pain and other pain conditions [3]. Pain intensity is the primary variable assessed in clinical trials for low back pain [4]. A precise assessment of pain intensity is vital for the informed selection of medical and rehabilitation treatments; it represents a notable challenge in clinical settings [5]. The most reliable and precise evidence of pain and its intensity is founded on the patient's self-reports and descriptions. The visual analogue scale

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(VAS) is the most widely utilized patient-reported outcome measure (PROM) for measuring pain intensity in low back pain trials, with the numeric rating scale (NRS) and the Brief Pain Inventory (BPI) being the next most common [2,5]. Regarding the clinical trials, the numeric rating scale (NRS) has been shown to be more reliable than the visual analogue scale (VAS), particularly among less educated patients [6].

To our knowledge, the assessment of the VAS, NRS, Face Pain Scale (FPS), and BPI scales has never been conducted on an Albanian sample. Measuring pain intensity scales for the first time in the Albanian population is significant as per cultural relevance and validity. Pain perception and expression can vary greatly across cultures and communities. Conducting pain measurements specifically in the Albanian population helps ensure that the scales are culturally appropriate, meaningful, and reliable for this group. This initial measurement also provides a baseline understanding of pain intensity and response patterns in the Albanian population. It helps establish norms and allows for comparison in future studies or clinical evaluations. Utilizing validated pain intensity scales specific to the Albanian population ensures that healthcare providers can more accurately assess and address pain, leading to better patient care, communication, and treatment outcomes. Establishing pain intensity data in Albania helps inform healthcare policies and allocate resources. Knowing the prevalence and intensity of pain can help prioritize healthcare needs and ensure appropriate support. When pain intensity scales are validated and used in a new population, as the Albanian population, it opens opportunities for research and clinical trials specific to that population. This can lead to new insights into pain management, treatment efficacy, and healthcare strategies tailored to the Albanian demographic. Measuring pain intensity for the first time in Albania, provides a benchmark against which future changes in pain perception, management, or prevalence can be measured. This can be critical in understanding the impact of healthcare interventions, public health strategies, or societal changes on pain levels. Overall, the initial measurement of pain intensity in the Albanian population establishes a foundation for evidence-based pain management practices, healthcare advancements, and future research that addresses the unique needs and characteristics of this community, thereby fulfilling the primary objective of this study.

Methods

This paper's reporting adheres to the 'Consensus-based Standards for the Selection of Health Measurement Instruments' (COSMIN) guidelines for studies evaluating the measurement properties of patient-reported outcome (PRO) measures [7].

Setting: Participants were recruited from the rehabilitation and orthopedic department of a hospital.

Participants

This cross-sectional study aimed to include a total of 200 Albanian participants in a regional healthcare center. The inclusion criteria required participants to be 50 years or older, had experienced back pain for over three weeks and be able to speak and write in Albanian. Exclusion criteria included the presence of a neurological or psychiatric disorder that could affect participation, inability to provide informed consent, or refusal to participate in the study.

Ethics

The study received approval from the Ethics Committee of the Catholic University of Murcia UCAM (prot. CE052107). and the Ethics Committee of the Health Ministry and Social Defense, Tirana, Albania (prot nr. 147/35). It was also registered on ClinicalTrials.gov prior to data collection under ID NCT04131998. All participants gave their written informed consent prior to entering the study, and the research adheres to the Declaration of Helsinki.

Data collection

After enrollment, participants completed a questionnaire that collected demographic information. The participants were subsequently asked to assess four domains of pain intensity—worst pain, average pain,

least pain over the past week, and current pain—utilizing four distinct pain intensity rating scales: the Visual Analog Scale (VAS), Numerical Rating Scale (NRS), Faces Pain Scale (FPS), and Pain Intensity Subscale of the Brief Pain Inventory (BPS-IS). All four scales have demonstrated reliability and validity in prior research and are widely utilized in both clinical and research contexts [8–11].

The data collection occurred during the patients' initial visits for lower back complaints. Examinations were carried out by nurses who were not part of the study and had no knowledge of the validation process. The participants received guidance on how to use each assessment tool, and the instructions were repeated up to three times upon request [1]. Also, they were asked to rate their current pain intensity, as well as their least, average, and worst pain intensity experienced over the past week.

The four versions of the VAS, NRS, FPS and BPI-IS scale were provided on separate pages to ensure that participants could not easily reference their prior responses when completing each scale. The measures were administered in a random sequence. Participants were also asked to indicate their preferred scale or to state that they had no preference if applicable [12].

The questionnaires were prepared by the study authors; duplicated and collected by the hospital nurses not involved in the study.

Pain assessment tools

The Visual Analogue Scale (VAS) is a continuous scale commonly represented as a 10-centimeter horizontal line, with two verbal descriptors at each end indicating no pain and worst pain. Using the VAS, the Albanian participants were asked to mark the line at the point that best represents their pain intensity, which can range anywhere between the two extremes.

Numeric Rating Scale (NRS) is a 10-point scale (also referred to as the NRS-11), where 0 signifies 'no pain' and 10 represents 'the worst imaginable pain' [13]. It is among the most frequently utilized measures of pain intensity in research and clinical settings [8,14]. Pain intensity reports from the NRS have demonstrated validity and reliability when utilized with adult populations [6]. This study participants were asked to select the number that most accurately describes their current pain.

This study employed the McGrath nine-face scale known as Face Pain Scale (FPS), which was modified into an 11-face scale for comparison with the numeric rating scale of 0–10 [15]. To eliminate bias stemming from personal beliefs about pain expression, the tears on the faces of the original nine-face scale were removed, as suggested by Kim and Buschmann, 2006 study. Faces were assigned scores from zero to ten to reflect different levels of pain, with zero denoting 'no pain' and ten signifying 'the worst pain possible'[16].

The intensity subscale of the Brief Pain Inventory (BPI-IS) was also used in this study as a validated composite measure of pain intensity [17]. This unidimensional scale comprises four items that ask about the worst and least pain experienced in the past week, the average pain, and the present pain level. Each item is rated on a scale from 0, which signifies no pain, to 10, indicating pain as severe as the person can imagine [2,18].

Sample size calculation

The sample size in this study aligned with the recommendations from the COSMIN Risk of Bias checklist, which states that a validation study should have a minimum sample size of 100 participants [19]. Prior to the start of the study, sample size calculations were performed using GPower software version 3.1.8 (GPower, Düsseldorf, Germany). According to the Lee et al. 2021 study, a sample size of 175 was necessary to achieve 90% power for detecting a difference in response rates between the scales, using a two-sided alpha of 0.05. Considering an estimated dropout rate of 15%, we aimed to recruit 200 patients [20].

Statistics

Data analysis was conducted using SPSS software version 25.0 (IBM Corp., Armonk, NY). Demographic data were analyzed descriptively, with categorical variables reported as frequencies and percentages, and

continuous variables summarized using means and standard deviations (SD). To assess the convergent validity of the scales – specifically, the relationship between each scale and a composite score of all measures, a principal components analysis was performed. The number of factors identified in the factor analysis was determined using a screen test [21], and the factor loadings were examined to assess the validity of the scales. Correlations among the four scales were determined using the Spearman rank correlation coefficient.

Results

A total of 200 elderly participants with LBP were involved in this study, with a mean age of 69.77 and a standard deviation (SD) of 6.34. The majority of participants were diagnosed with nonspecific back pain, having a mean age of 63.37 and a standard deviation of 6.66. Arthritis was the second most common diagnosis, with affected participants having a mean age of 69.14 and a standard deviation of 4.17. This group also had the highest number of married individuals, with a mean of 2.26 and a standard deviation of 0.67. No exclusion or drop-out was reported in this study. All the participants completed the four pain intensity questionnaires.

Table 1 provides a detailed description of all study participants.

Table 2 displays the sample means and SD for the four scales assessed in this study. This table also presents the VAS, NRS, FPS, and BPI-IS pain rating scores for each domain of pain intensity, including current pain, least, average, and worst.

The Pearson correlation coefficients for each pair of scales are shown in Table 3. There were significant correlations among the four scales across all domains of pain intensity.

The screen test from the principal component analyses indicated that the four scales captured a single overarching domain for each of the four pain intensity areas, with the first eigenvalue ranging from 2.33 to 3.63 and the second from 0.16 to 0.43 (Table 4). Moreover, all the scales showed a strong loading on the single component that emerged. The four scales had the highest loading on 'current pain' component (>0.9).

Regarding scale preference, the VAS scale was favored by the majority of participants, receiving a preference rate of 36%. The second most preferred scale was the NRS, which had a frequency of 29%. The FPS was preferred by 22.5% of the participants and the last one was the BRS with 12.5% of preference frequency.

Table 1. Participant's characteristics.

	Age			Civil status						Professional status			
Diagnosis	*N*	Mean	SD	Single (N)	Married (N)	Divorced (N)	Widower (N)	Total mean (SD)		Worker (N)	Retiree (N)	Total mean (SD)	
Back pain	86	68.37	6.669	3	42	6	35	2.85	1.012	30	56	1.65	0.479
Discal Hernia	5	74.20	9.654	0	4	0	1	2.40	0.894	0	5	2.00	0.000
Lumbar Trauma	18	78.39	1.852	0	18	0	0	2.00	0.000	0	18	2.00	0.000
coxo-femoral luxacion	5	72.00	8.944	3	1	0	1	1.80	1.304	1	4	1.80	0.447
Lumbar fracture	14	68.07	6.330	10	3	0	1	1.43	0.852	8	6	1.43	0.514
Arthritis	72	69.14	4.170	0	62	1	9	2.26	0.671	37	35	1.49	0.503

N = number of participant's; SD = Standard Deviation.

Table 2. Means and standard deviations of the pain ratings ($N = 200$).

	Current pain intensity in the past week		Least pain intensity in the past week		Average pain intensity in the past week		Worst pain intensity in the past week	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
VAS	3.51	0.783	3.28	0.776	3.40	0.701	4.01	0.908
NRS	3.47	0.729	3.20	0.770	3.37	0.652	3.83	0.798
FPS	3.47	0.736	3.15	0.843	3.52	0.657	3.74	0.760
BRS	3.59	0.771	3.20	0.928	3.73	0.825	3.94	0.815

VAS: Visual Analogue Scale; NRS: Numeric Rating Scale; FPS: Face Pain Scale; BRS: Behavioral Rating Scale; SD: Standard Deviation.

Table 3. Pearson correlation coefficients between four pain rating scales.

		VAS				NRS				FPS				BRS			
		Current	Least	Average	Worst	Current	Least	Average	Worst	Current	Least	Average	Worst	Current	Least	Average	Worst
VAS	Current																
	Least	0.777**															
	Average	0.812**	0.631**														
	Worst	0.629**	0.438**	0.554**													
NRS	Current	0.912**	0.688**	0.799**	0.593**												
	Least	0.647**	0.580**	0.532**	0.400**	0.666**											
	Average	0.751**	0.553**	0.690**	0.478**	0.820**	0.602**										
	Worst	0.618**	0.451**	0.573**	0.439**	0.693**	0.458**	0.598**									
FPS	Current	0.907**	0.714**	0.758**	0.595**	0.836**	0.578**	0.672**	0.594**								
	Least	0.523**	0.397**	0.537**	0.274**	0.491**	0.317**	0.419**	0.345**	0.550**							
	Average	0.801**	0.625**	0.686**	0.505**	0.741**	0.489**	0.616**	0.529**	0.884**	0.521**						
	Worst	0.676**	0.499**	0.556**	0.492**	0.632**	0.409**	0.503**	0.470**	0.754**	0.399**	0.680**					
BRS	Current	0.931**	0.735**	0.747**	0.602**	0.841**	0.613**	0.703**	0.536**	0.837**	0.481**	0.760**	0.628**				
	Least	0.568**	0.532**	0.507**	0.308**	0.563**	0.458**	0.412**	0.392**	0.557**	0.406**	0.566**	0.444**	0.569**			
	Average	0.767**	0.611**	0.629**	0.520**	0.694**	0.552**	0.616**	0.485**	n	0.362**	0.705**	0.567**	0.820**	0.509**		
	Worst	0.619**	0.473**	0.547**	0.436**	0.584**	0.429**	0.480**	0.384**	0.562**	0.299**	0.514**	0.451**	0.685**	0.396**	0.699**	

**$p < 0.001$; VAS: Visual Analogue Scale; NRS: Numeric Rating Scale; FPS: Face Pain Scale; BRS: Behavioral Rating Scale.

Table 4. Component loadings from the principal components analyses of the four rating scales.

	Current	Least	Average	Worst
VAS	0.984	0.834	0.874	0.796
NRS	0.947	0.787	0.873	0.778
FPS	0.941	0.777	0.855	0.746
BRS	0.939	0.661	0.846	0.736
First two eigenvalues	3.633	2.357	2.972	2.337
	0.166	0.716	0.432	0.617
Kaiser–Meyer–Olkin Measure	0.825	0.755	0.820	0.778
Bartlett's test of sphericity	1088.661	203.152	429.785	183.614

Discussion

The study's findings are generally consistent with previous research comparing different pain intensity measures in Albanian older adults with low back pain and add new information on the validity, utility, and preferences for using the VAS, NRS, FPS and BPI-IS [1,8].

These findings hold significant implications for selecting the most appropriate measures to use in this population within both clinical and research settings as per study objective. The results indicate that for those who can effectively use the scales, each is considered valid, as evidenced by their strong relationships with a general pain intensity factor identified through principal components analysis. This is also demonstrated by strong correlations with past pain measures obtained in daily diaries [22,23].

Referring to the systematic review of Chiarotto et al. 2019, The NRS is widely considered the best option for evaluating pain intensity in patients with LBP [2]. The results of the Atisook et al. 2021 study also align with the participants' preference for the NRS [8]. Although there is a preference for the NRS, the VAS has remained the most commonly used pain assessment tool in clinical trials for LBP to date [4]. In fact, in our study, out of 200 Albanian participants, 72 expressed a preference for the VAS. This preference may be linked exclusively to the intensity of back pain experienced by the participants.

Like prior studies, our results confirmed that VAS is particularly effective for patients with adequate cognitive function and literacy levels, as its continuous scale allows for precise measurement of pain intensity as noted by Ferreira-Valente et al. [10].

The NRS demonstrated strong user compliance in our sample, consistent with other studies emphasizing its practicality and ease of use. Previous research has emphasized its strong correlation with VAS scores, and our results supported this, further validating its use in clinical and research settings [6].

Another study found that both cognitively impaired and cognitively intact older adults favored the FPS over other pain intensity measures [24]. The Albanian participants ranked the FPS as their third preference for measuring pain intensity, with 45 out of 200 participants indicating a preference for the FPS.

BPI-IS was chosen less frequently, possibly because it is not as easy to administer as the other instruments. The results presented in the Chiarotto et al. (2018) study indicated that the Brief Pain Inventory–Pain Severity subscale (BPI-PS) was the least preferred among the population. The fee scale administration may also be another factor that influenced participants' preferences [25].

The BPI-IS results offered a comprehensive assessment of pain's impact on daily functioning in Albanian population with back pain. Consistent with Cleeland and Ryan (1994), our findings underscore the BPI's ability to capture the multidimensional nature of pain, making it a valuable tool for chronic pain assessment [26].

To address potential biases and improve the validity of the responses, as mentioned in the method section, the four pain intensity scales – VAS, NRS, FPS, and BPI-IS – were presented on separate pages. This method ensured that participants could not easily refer to or influence their responses to earlier scales while completing the others. Additionally, by randomizing the order in which the scales were administered, we aimed to minimize the impact of sequence effects, where the order in which measures are presented could unintentionally affect responses.

The rationale behind using randomization and separate pages is to reduce the likelihood that participants' answers to one scale could be influenced by prior responses. For example, if participants saw a previous pain intensity score before completing the next scale, they might adjust their answers based on that reference. Furthermore, randomizing the sequence prevents any bias that might arise from

participants responding differently depending on the position of the scale in the sequence (e.g. they might become fatigued or more focused after completing certain scales first). To further clarify, randomization of measure presentation ensured that each participant received the scales in a unique order, reducing the chance of systematic errors or patterns that could distorted the results.

As per study results, the VAS was considered as the most appropriate tool for pain assessment in this population. In particular, the VAS's ability to measure pain intensity on a continuous scale makes it a valuable tool for healthcare professionals, allowing for nuanced assessments of pain severity. Its established reliability in various clinical settings further supports its use as a standard assessment tool. Regarding the Albanian regional relevance, we have expanded on how these findings inform best practices in pain measurement for healthcare professionals in this area. Given the cultural and healthcare context of this population, the VAS provides a straightforward and effective tool that can be easily integrated into routine clinical practice. We have also discussed how adopting the VAS as a standard tool in the region could improve consistency in pain assessment, leading to better pain management strategies and ultimately enhancing patient care.

This study has several limitations that should be considered. First, relying solely on self-report measures may lead to significant associations among variables due to shared method variance, potentially resulting in an overestimation of true relationships [27]. Secondly, the measurement of back pain intensity can be considered as a subjective experience that can differ significantly from one individual to another. Cultural beliefs and practices regarding pain can influence how individuals respond to pain scales, potentially affecting the validity of the results. Factors such as anxiety, depression, and stress, which were not assessed in this study, can influence pain perception and reporting, potentially distorting the results. Many pain scales provide a limited range of options, which may not capture the complexity and multifaceted nature of Albanians pain experiences. Ultimately, repeated assessments of the four scales may lead to fatigue or desensitization, affecting how the Albanian participants reported their pain over time. For future studies, a test-retest analysis is recommended to evaluate the reliability of the four pain intensity scales.

Given the findings of this study, we recommend the Visual Analog Scale (VAS) as the primary tool for assessing pain intensity in this population. For healthcare professionals in this region, we suggest that the VAS be considered as a standard measure in both clinical and research settings due to its ease of use and proven effectiveness. However, we recognize that there may be some variability in patient preferences and abilities. In cases where patients experience difficulties with the VAS, either due to cognitive limitations or visual impairments, we recommend the Numeric Rating Scale (NRS) as a viable alternative. The NRS is straightforward and often easier for patients to understand, especially for those who may struggle with interpreting visual analogs. For patients who have difficulty expressing pain verbally or numerically, particularly young children or older adults, the Faces Pain Scale (FPS) is a more appropriate tool, as it uses facial expressions to represent pain levels, which can be more intuitive. Lastly, for more comprehensive pain assessments, particularly in cases where pain affects multiple aspects of a patient's daily life, the Brief Pain Inventory (BPI) is recommended. While longer and more complex, the BPI offers valuable insights into how pain impacts functionality, helping healthcare providers address pain from a holistic perspective.

Future studies should explore the cultural adaptability of these scales, particularly in multicultural settings where language and cultural differences might influence scale interpretation. Additionally, longitudinal studies incorporating test–retest analyses could further validate the reliability of these scales in chronic pain conditions.

By situating our findings within the context of existing research, we emphasize the importance of choosing pain assessment tools that align with both patient characteristics and clinical objectives.

Concluding, the four pain scales as VAS, NRS, FPS and BPI-IS are valid and can be used for the clinical and research implication in the Albanian population.

Ethics committee information

An observational cross-cultural study was implemented in accordance with the Ethics Committee of Health Ministry and Social Defense, Tirana, Albania (prot nr. 147/35) and Catholic University of Murcia UCAM Ethics Committee (prot. CE052107).

Author contributions

Jasemin Todri and Orges Lena contributed to the conception, design, and data analysis. Jasemin Todri, Enkeleda Gjini, and Orges Lena were responsible for interpreting the data and drafting the manuscript. The three authors were responsible for critically revising the paper for intellectual content, providing final approval of the version to be published, and agreeing to be accountable for all aspects of the work.

Disclosure statement

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

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Data availability statement

All processed data for the study are included within the manuscript. The data used to support the findings of this study are available from the corresponding author upon request.

References

[1] Nimmaanrat S, Thepsuwan A, Tipchatyotin S, et al. Measuring pain intensity in older patients: a comparison of five scales. BMC Geriatr. 2024;24(1):556. doi: 10.1186/s12877-024-05127-6.
[2] Chiarotto A, Maxwell LJ, Ostelo RW, et al. Measurement Properties of Visual Analogue Scale, Numeric Rating Scale, and Pain Severity Subscale of the Brief Pain Inventory in patients with low back pain: a systematic review. J Pain. 2019;20(3):245–263. doi: 10.1016/j.jpain.2018.07.009.
[3] Kaiser U, Kopkow C, Deckert S, et al. Developing a core outcome domain set to assessing effectiveness of interdisciplinary multimodal pain therapy: the VAPAIN consensus statement on core outcome domains. Pain. 2018;159(4):673–683. doi: 10.1097/j.pain.0000000000001129.
[4] Froud R, Patel S, Rajendran D, et al. A systematic review of outcome measures use, analytical approaches, reporting methods, and publication volume by year in low back pain trials published between 1980 and 2012: respice, adspice, et prospice. PLoS One. 2016;11(10):e0164573. doi: 10.1371/journal.pone.0164573.
[5] Salaffi F, Stancati A, Silvestri CA, et al. Minimal clinically important changes in chronic musculoskeletal pain intensity measured on a numerical rating scale. Eur J Pain. 2004;8(4):283–291. doi: 10.1016/j.ejpain.2003.09.004.
[6] Hawker GA, Mian S, Kendzerska T, et al. Measures of adult pain: visual Analog Scale for Pain (VAS Pain), Numeric Rating Scale for Pain (NRS Pain), McGill Pain Questionnaire (MPQ), Short-Form McGill Pain Questionnaire (SF-MPQ), Chronic Pain Grade Scale (CPGS), Short Form-36 Bodily Pain Scale (SF-36 BPS), and Measure of Intermittent and Constant Osteoarthritis Pain (ICOAP). Arthritis Care Res (Hoboken). 2011;63 Suppl 11:S240–S252. doi: 10.1002/acr.20543.
[7] Gagnier JJ, Lai J, Mokkink L, et al. SOSMiN reportingguideline for studies on measurement properties of patient-reported outcome measures. Qual Life Res. 2021;30(8):2197–2218. doi: 10.1007/s11136-021-02822-4.
[8] Atisook R, Euasobhon P, Saengsanon A, et al. Validity and utility of four pain intensity measures for use in international research. J Pain Res. 2021;14:1129–1139. doi: 10.2147/JPR.S303305.
[9] Strong J, van Griensven H. Pain assessment and measurement. In: Van Griensven H, Strong J, Unruh A, editors. Pain: A Textbook for Health Professionals. 2nd ed. London: Churchill Livingstone; 2014. 91–113.
[10] Ferreira-Valente MA, Pais-Ribeiro JL, Jensen MP. Validity of four pain intensity rating scales. Pain. 2011;152(10):2399–2404. doi: 10.1016/j.pain.2011.07.005.
[11] Peters ML, Patijn J, Lamé I. Pain assessment in younger and older pain patients: psychometric properties and patient preference of five commonly used measures of pain intensity. Pain Med. 2007;8(7):601–610. doi: 10.1111/j.1526-4637.2007.00311.x.
[12] Scher C, Meador L, Van Cleave JH, et al. Moving beyond pain as the fifth vital sign and patient satisfaction scores to improve pain care in the 21st century. Pain Manag Nurs. 2018;19(2):125–129. doi: 10.1016/j.pmn.2017.10.010.

[13] Jensen MP, Chen C, Brugger AM. Interpretation of visual analog scale ratings and change scores: a reanalysis of two clinical trials of postoperative pain. J Pain. 2003;4(7):407–414. doi: 10.1016/S1526-5900(03)00716-8.
[14] Chien CW, Bagraith KS, Khan A, et al. Comparative responsiveness of verbal and numerical rating scales to measure pain intensity in patients with chronic pain. J Pain. 2013;14(12):1653–1662. doi: 10.1016/j.jpain.2013.08.006.
[15] McGrath PA. An assessment of children's pain: a review of behavioral, physiological and direct scaling techniques. Pain. 1987;31(2):147–176. doi: 10.1016/0304-3959(87)90033-9.
[16] Kim EJ, Buschmann MT. Reliability and validity of the Faces Pain Scale with older adults. Int J Nurs Stud. 2006;43(4):447–456. doi: 10.1016/j.ijnurstu.2006.01.001.
[17] Poquet N, Lin C. The Brief Pain Inventory (BPI). J Physiother. 2016;62(1):52. doi: 10.1016/j.jphys.2015.07.001.
[18] Kim HJ, Jung SO. Comparative evaluations of single-item pain-intensity measures in cancer patients: numeric rating scale vs. verbal rating scale. J Clin Nurs. 2020;29(15–16):2945–2952. doi: 10.1111/jocn.15341.
[19] Terwee CB, Prinsen CAC, Chiarotto A, et al. COSMIN methodology for evaluating the content validity of patient-reported outcome measures: a Delphi study. Qual Life Res. 2018;27(5):1159–1170. doi: 10.1007/s11136-018-1829-0.
[20] Lee HJ, Cho Y, Joo H, et al. Comparative study of verbal rating scale and numerical rating scale to assess postoperative pain intensity in the post anesthesia care unit: a prospective observational cohort study. Medicine (Baltimore). 2021;100(6):e24314. doi: 10.1097/MD.0000000000024314.
[21] Horn JL, Engstrom R. Cattell's Scree test in relation to Bartlett's Chi-Square test and other observations on the number of factors problem. Multivariate Behav Res. 1979;14(3):283–300. doi: 10.1207/s15327906mbr1403_1.
[22] Zhou Y, Petpichetchian W, Kitrungrote L. Psychometric properties of pain intensity scales comparing among postoperative adult patients, elderly patients without and with mild cognitive impairment in China. Int J Nurs Stud. 2011;48(4):449–457. doi: 10.1016/j.ijnurstu.2010.08.002.
[23] Bergh I, Sjöström B, Odén A, et al. An application of pain rating scales in geriatric patients. Aging (Milano). 2000;12(5):380–387. doi: 10.1007/BF03339864.
[24] Taylor LJ, Herr K. Pain intensity assessment: a comparison of selected pain intensity scales for use in cognitively intact and cognitively impaired African American older adults. Pain Manag Nurs. 2003;4(2):87–95. doi: 10.1016/s1524-9042(02)54210-7.
[25] Chiarotto A, Boers M, Deyo RA, et al. Core outcome measurement instruments for clinical trials in nonspecific low back pain. Pain. 2018;159(3):481–495. doi: 10.1097/j.pain.0000000000001117.
[26] Cleeland CS, Ryan KM. Pain assessment: global use of the Brief Pain Inventory. Ann Acad Med Singap. 1994;23(2):129–138.
[27] Mendoza ME, Gertz KJ, Jensen MP. Contributions of four pain domains to the prediction of patient functioning and pain interference. Psychol Neurosci. 2014;7(1):3–8. doi: 10.3922/j.psns.2014.1.02.