RESEARCH ARTICLE

Validity and reliability study for the Turkish version of global pain scale

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Abstract

Introduction: To investigate the validity and reliability of the "Global Pain Scale" for Turkish population.

Methods: The cross-sectional study was conducted at the Algology outpatient clinic of a university hospital in Izmir, Turkey, between March and December 2015, and comprised patients with chronic pain aged at least 18 years. Linguistic equivalence, content validity and construct validity were used for establishing the validity of the Global Pain Scale, while the Content Validity Index was used for the assessment of expert views. SPSS 16was used for data analysis.

Results: Of the 222 subjects, 142(64%) were females. Overall mean age of the sample was 54.22±13.79 years. Cronbach's alpha coefficient for the entire scale was 0.95. Total item correlation coefficients of the items in the scale ranged between 0.502 and 0.794, and no items were removed from the scale.

Conclusion: The Global Pain Scale was found to have adequate validity and reliability indicators, and can be used with confidence in patients experiencing chronic pain.

Keywords: Chronic pain, Global pain scale, Turkish, Validity, Reliability, Methodological study.
(JPMA 69: 1246; 2019)

Introduction

The most pertinent definition of pain, which is a universal experience, was made by the International Association for the Study of Pain, describing pain as an unpleasant sensory and emotional experience, which accompanies present/potential tissue damage or can be defined by such damage.[1] Chronic pain is a pain that lasts more than 3 months and continues to prevail after the expected recovery period, a universal problem gravely affecting the psychosocial status, quality of life and functioning of patients.[1-4] Although the patients receive various treatments for a long time, the treatment of pain is difficult and for this reason it should be dealt with as a disease on its own.[4-6] Chronic pain may result in pathologies that are difficult to accept and tolerate, such as loss of appetite, weight-loss,libido-loss, hormonal disorders, constipation, weariness, sleep disorders, psychomotor disorders, immobility and resulting muscle and joint pains, increased irritability, reduced quality of life, depression, and decreased mental performance, and may create long-lasting and damaging outcomes in the human body.[4-6] Therefore, it is important to manage chronic pain effectively, and to do this, it needs to be assessed correctly.

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Pain is a subjective experience and this point should be taken into consideration when assessing pain. In this context, the way pain is perceived and defined, and behavioural reactions to pain vary from person to person. This makes it necessary to assess the person experiencing pain comprehensively by using appropriate assessment techniques.[7-12] Appropriate and correct assessment of pain plays a key role in the effectiveness of the pain management process, especially in patients experiencing chronic pain.

Assessment and measurement of the pain experience have critical significance in both deciding on the type of treatment management and assessing the efficacy of the medical, interventional or surgical methods employed for treatment in clinical studies. This experience, which affects human life negatively, impairs quality of life and brings a number of pathologies with it, should be measured using a common language.[13-18] There are many scales currently used for assessing pain. When assessing chronic pain, the personal reports of the patient should also be considered alongside their physical characteristics and clinical tests. The patient's pain complaint and their behavioural reactions to pain should not be seen in a prejudiced way. As pain is a subjective experience, patients should be well-observed, their anamnesis should be taken correctly and scales, which are adopted by everyone and not leading to different interpretations and whose validity and

reliability have been evidenced, should be used when assessing pain. Pain assessment scales make the severity and nature of pain as objective as possible, eliminate interpretational differences between the patient and health professionals, and enable evaluation of the efficacy of treatment methods.[13-17]

Physicians and nurses in our country mostly use the scales that were developed in other cultures and adapted later to our language when assessing chronic pain. Adapting a scale, which is adequately known in international publications and on which there is accumulation of knowledge, to our language and utilising it would shorten the time to be spent by health professionals in preparing a new scale and provide ease of communication and comparable information.[19] Such developments in the pain measurement methods will enable a more objective, reliable and consistent measurement of pain.[15]

Scales adapted to our language are being used in our country to assess patients with chronic pain and to monitor the efficacy of their treatments.[14,15,21,20] Today, rather than trying to control pain, the concepts of accepting pain, living with pain and pain volunteering have been the focal points of the studies on the control of pain.[22-28] The current study was planned to investigate the validity and reliability of the Turkish version of Global Pain Scale (GPS), which focuses on the perception of pain, pain-related feelings of patients, impact of pain on activities of daily living, and its clinical outcomes.

Materials and Methods

Participants and Design

The cross-sectional study was conducted at the Algology outpatient clinic of a university hospital in Izmir, Turkey, between March and December 2015 , and comprised patients with chronic pain aged at least 18 years.

The study was conducted in stages after obtaining relevant permissions at each stage using a self-generated Patient Description Form (PDF), the GPS[29] and the Brief Pain Inventory (BPI)[21] as data-collection instruments.

Patient Description Form: PDF consisted of information on age, gender, education status, occupation, site and duration of pain, patient's diagnosis and treatment received.

Global Pain Scale: GPS was developed by Gentile et al. in 2011 for patients with chronic pain. The 33-item scale is composed of 4 subscales about the chronic pain experiences of patients. The 1st subscale deals with the current pain status, and the least, most and average pain severities felt in the preceding week. The 2nd subscale deals with the extent the patients had feelings of distress, anxiety, fear, hopelessness, tiredness and being terrified in the preceding week. In the 3rd subscale, the effect of the treatment received by the patients on their clinical outcome are explored, while the 4th subscale checks whether or not the patients were able to perform their daily activities. The scale is scored with an 10-point Likert-type scoring system; 1-4 points = mild; 5-6 points = moderate; and 7-10 points = severe condition.[29] Brief Pain Inventory: The BPI is a questionnaire determining the presence of pain, its locality, severity, changes in its severity, treatments, responses to these treatments, extent of being affected in social-emotional terms, and impact of pain on daily functioning of patients, particularly based on the preceding 24 hours. In BPI, scores 1-4 is considered mild, 5-6 moderate, and 7-10 severe pain. The Cronbach α value is reported to be 0.79-0.80 in the validity and reliability study of the Turkish version of BPI made with patients post-surgery.[21]

Evulation of Data

In the first stage of the current study, the validity and reliability of GPS was determined. After obtaining permission from the first author who developed the scale, then a translator with a good command of both Turkish and English langauges, and, finally, 10 lecturers, specialists and research associates working in the Anaesthesiology and Reanimation Department of the hospital translated the scale from English to Turkish in order to verify the linguistic validity of the scale. The final version of the scale that was formed by selecting the most suitable expressions from its Turkish translations was then back-translated into English by a different translator who spoke and understood both languages fluently. The back-translated items of the scale were examined by comparing them to their originals and the scale was finalised after necessary corrections were made. It was then presented to 4 anaesthetists and 2 algology specialists for expert views to test its linguistic and cultural equivalence and content validity. The experts were asked to rate each item in terms of its appropriateness by giving scores from 0 to 100 and the participation percentages of the experts were compared for each item. Kaiser-Meyer-Olkin (KMO) values of 0.80 or higher are considered good, and those in the 0.70s are fair.[29-32] In

this study KMO sampling adequacy for the scale was good at 0.847, indicating fitness for conducting factor analysis (FA). Sampling Adequacy, which refers to the adequacy of sampling variables, is important for FA. The exploratory factor analysis (EFA) for reliability and validity scale was done.[30,31] For content validity, CVI was calculated by considering the experts' views.[30-32] Kolmogorov-Smirnov test was applied to test normality by comparing the data to a normal distribution with the same mean and standard deviation of sample.323 The results showed 95% of reliability interval and the level of significance was set at $p<0.05$.[30-32]

For the reliability study of the scale, test-retest technique was used to determine its invariability over time criterion. The scale was administered to 10 patients once more two weeks after the initial measurements. The test-retest technique was evaluated with the Pearson product-moment correlation. To determine the scale's internal consistency, Spearman Brown formula, Guttman Split-Half formula, Cronbach α coefficient and correlation coefficients were calculated.

After completing all these steps, the data-collection process was started with a pilot administration at the second stage of the study. GPS was pilot-tested on 10 patients to find out whether it was an understandable and appropriate scale. The subjects were selected from the patients who presented to the Algology out-patient department (OPD) of the hospital, but this group was not included in subsequent analyses.

The third stage of the study comprised all patients with chronic pain aged over 18 years presenting at the Algology OPD between March and December 2015 and who agreed to take part in the study, who were at least primary school graduates, who had chronic pain continuing for at least 3 months, who were able to establish communication and could speak Turkish, and who had no hearing problems or cognitive disorders.

For sample size calculation, the number of items in the scale (33 items) was taken into consideration. In scale validity and reliability studies, the recommended number of participants per-item is 5-10.33 Data was collected using face-to-face interviews and each interview took about 15 minutes. For test-retest reliability, GPS was administered once more two weeks after the first administration to 10 patients.

Statistical Analysis

Data was analysed using SPSS 16. Frequencies, percentages, means and standard deviations were calculated. Pearson product-moment correlation technique, split-half reliability analysis, total item correlation analysis, Cronbach α confidence coefficient, Gutman Split-Half and Spearman Brown confidence coefficients were used in data analyses.

Ethical Considerations

Written permissions were obtained to conduct the study from the Ethics Committee of the university hospital where the study was performed and from the Algology unit in the Anaesthesiology and Reanimation Department of the hospital where the study would be performed. The patients participating in the study were given necessary explanations about the purpose of the study, the method of implementing it and the results expected to be obtained, and their written consents were obtained.

Results

Of the 222 subjects, 142 (64%) were females. Overall mean age of the sample was 54.22±13.79 years. Among the females, 101(71%) were housewives. Overall patients had lumbar hernia 89(40.1%), degenerative joint disease 47(21.2%), cervical hernia 18(8.1%), trigeminal neuralgia 17(7.7%), myofascial pain 16(7.2%) and fibromyalgia 9(4.1%). The patients had been experiencing pain for 68.64±64.08 months. The pain was in the waist-hip region in 84(37.8%) patients, neck-shoulder region 33(14.9%), and back region 27(12.2%). While 52(23.4%) patients used more than one analgesic (Non-opioid + adjuvant, weak opioid + adjuvant, non-opioid + weak opioid, etc.), 42(18.9%) used non-steroidal anti-inflammatory drugs (NSAIDs) alone.

Kendall Coefficient of Concordance (Wa) of the expert views obtained for the GPS was 0.798, indicating that the views of experts were in concordance. As a result of the principal components analysis of the scale, the scale items were found to group under 4 factors. These 4 factors accounted for 89.989% of the total variance. The variance loads attributed to the factors were calculated as 4.578 for Factor 1, 17.945 for Factor 2, 18.884 for Factor 3 and 20.483 for factor 4. The compatibility of the 4 factors with the subscales was assessed with EFA and the factor loads of the items ranged between 0.080 and 0.848 (Table 1).

The study planned to have a minimum 10 subjects with 95% reliability, 0.9 effect size and 83% theoretical power

Table-1: Results of Factor Analysis for Global Pain Scale.

Items	Subscales			
	Pain Volunteering (Factor 1)	Feelings (Factor 2)	Clinical outcomes (Factor 3)	Performing activities (Factor 4)
My current pain	0.314	0.187	0.494	0.439
During the past week. The best my pain has been is	0.714	0.625	0.521	0.747
During the past week. The worst my pain has been is	0.568	0.606	0.647	0.661
During the past week may average pain has been	0.149	0.360	0.274	0.358
During the past week i have felt less pain	0.838	0.922	0.760	0.937
During the past week i have felt distressed	0.838	0.848	0.654	0.734
During the past week i have felt anxious	0.189	0.258	0.589	0.406
During the past week i have felt afraid	0.719	0.870	0.664	0.510
During the past week i have felt hopeless	0.356	0.584	0.664	0.339
During the past week i have felt exhausted	0.167	0.270	0.394	0.417
During the past week i have felt terrified	0.159	0.234	0.344	0.398
During the past week i had trouble sleeping	0.236	0.080	0.267	0.118
During the past week i have felt extremely uncomfortable	0.328	0.320	0.463	0.484
During the past week i took a few medications	0.512	0.660	0.753	0.748
During the past week my general mental state was good	0.569	0.339	0.583	0.475
During the past week i was more independent	0.212	0.388	0.502	0.405
During the past week i had more energy	0.740	0.776	0.603	0.748
During the past week i was able to do my chores	0.325	0.317	0.559	0.458
During the past week i had more control over my pain	0.261	0.291	0.377	0.427
During the past week i needed to see my doctor less frequently	0.683	0.660	0.688	0.675
During the past week i was satisfied with my medical care	0.705	0.767	0.689	0.604
I cannot go shopping these days	0.264	0.277	0.334	0.311
I cannot do chores at home these days	0.672	0.520	0.689	0.437
I cannot exercise these days	0.688	0.597	0.623	0.512
I cannot have a bath and get dressed alone these days	0.331	0.315	0.498	0.377
I cannot enjoy my friends and family these days	0.734	0.561	0.672	0.637
I cannot spend time outside these days	0.501	0.697	0.645	0.735
I cannot go up and down the stairs these days	0.581	0.641	0.591	0.629
I cannot bend over to pick things up these days	0.653	0.693	0.699	0.741
I cannot stand as long as i want these days	0.657	0.703	0.673	0.638
I cannot have a walk as much as i want these days	0.179	0.465	0.387	0.281
I cannot drive these days	0.134	0.145	0.244	0.439
I cannot enjoy sex easily these days	0.203	0.422	0.367	0.486

because of the difficulties in reaching the patients for test-retest. According to the test-retest results, the correlation coefficient (r) obtained by way of administering the scale to 10 patients second time after a 2-week interval was 0.917 ($p<0.001$). Correlation analysis performed to test the invariability of the subscales over time showed that the test-retest correlation coefficient of 'Your pain' subscale was 0.883, that of 'Your feelings' subscale 0.897, that of 'Clinical outcomes' subscale 0.938, and 'Your activities' subscale 0.883 ($p<0.001$).

Correlation coefficients were between 0.813 and 0.921 in the split-half test analyses. The reliability coefficient of one half of the scale was r=0.958. The reliability coefficient for the entire scale was calculated using the Spearman-Brown formula and it was r=0.941. The Cronbach α reliability coefficient of the scale was 0.95. The Cronbach α coefficient of 'Your pain; subscale was 0.89, 'Your feelings' 0.90, 'Clinical outcomes' 0.93, and that of 'Your activities' subscale 0.93.

Table-2: Correlation Results of Global Pain Scale and Brief Pain Inventory.

BPI Items	Activities	Pain	Feelings	Clinical Outcome
Item 3	r=-0.226, p=0.000	r=-0.289, p=0.000	r=-0.162, p=0.000	r=-0.222, p=0.000
Item 4	r=-0.261, p=0.000	r=-0.375, p=0.000	r=-0.336, p=0.000	r=-0.276, p=0.000
Item 5	r=-0.514, p=0.000	r=-0.583, p=0.000	r=-0.378, p=0.000	r=-0.488, p=0.000
Item 6	r=-0.248, p=0.000	r=-0.276, p=0.000	r=-0.355, p=0.000	r=-0.335, p=0.000
Item 8	r=0.045, p=0.000	r=0.053, p=0.000	r=0.044, p=0.000	r=0.032, p=0.000
Item 9(a)	r=-0.852, p=0.071	r=-0.847, p=0.058	r=-0.882, p=0.051	r=-0.805, p=0.044
Item 9(b)	r=-0.485, p=0.000	r=-0.416, p=0.000	r=-0.548, p=0.000	r=-0.512, p=0.000
Item 9(c)	r=-0.017, p=0.023	r=-0.247, p=0.012	r=-0.206, p=0.023	r=-0.143, p=0.023
Item 9(d)	r=-0.179, p=0.000	r=-0.475, p=0.000	r=-0.373, p=0.000	r=-0.279, p=0.000
Item 9(e)	r=-0.274, p=0.000	r=-0.472, p=0.000	r=-0.381, p=0.000	r=-0.318, p=0.000
Item 9(f)	r=-0.359, p=0.000	r=-0.368, p=0.000	r=-0.352, p=0.000	r=-0.347, p=0.000
Item 9(g)	r=-0.448, p=0.000	r=-0.453, p=0.000	r=-0.496, p=0.000	r=-0.436, p=0.000

The total item correlation scores of GPS were between 0.50 and 0.79. Therefore, no items were excluded from the scale. The relation between the scores of GPS and the 3rd, 4th, 5th, 6th, 8th, and 9th items of BPI were calculated by Spearman correlation coefficient and this correlation was statistically non-significant ($p>0.05$) (Table 2). The mean score of GPS items was 189.8± 55.2, that of 'Your activities' subscale 71.4± 31,4, 'Your pain' 28.5± 8.5, 'Your feelings' 38.2±18,1, and that of 'Clinical outcomes' subscale was 51.3±17.2.

Discussion

Considering the need for a measurement tool for revealing the statuses of patients experiencing chronic pain in terms of some variables in physical and psychological dimensions (perceived pain, feelings, clinical outcomes and living activities), this study was conducted to adapt the GPS to Turkish language.

The adaptation of the scale to Turkish was done in the study through reliability and validity studies, which are basic psychometric studies. First, the scale items were translated into Turkish, their linguistic and content validity was investigated and then the psychometric characteristics of the Turkish version of the scale were assessed using the internal consistency, test-retest, item reliability and construct validity methods. The content validity rate, which assesses the concordance of expert views, showed that there was a high concordance among the experts, and the scale represented the area that was intended to be measured, and the content validity criteria stood satisfied.[34] As a result, it can be said that the scale had an understandable level of language structure and content.

Reliability is the basic characteristic which any measurement instrument must have and is the ability of a measurement instrument to measure without any errors. This characteristic determines whether the instrument collects data correctly and whether it can be repeated.[35-37] To conduct a reliability analysis, correlation coefficient is calculated for an item analysis, which is frequently used in selecting items and determines to what extent the items comprising the tool are relevant as a whole. In item analyses, the correlation between the total score obtained by the responders from the measurement tool and the total score they received from each item is calculated. If the correlation of an item with the total score is low, it can be interpreted that that item measures a characteristic different from those measured by the other items. Since a low total item score correlation has a reliability-reducing effect, those items are removed from the scale. As a result of the item analysis we performed, all items of the scale had a sufficient level of total item correlations.[35-37]

It is very important that the scale should have coherence itself because it is the evaluation criterion for itself. The alpha coefficients of a scale that consists of items highly correlated with each other should turn out to be high. The Cronbach alpha coefficient is a criterion of the internal consistency and homogeneity of the items included in the scale. The higher the Cronbach alpha coefficient of a scale, the more consistent its items are with each other and the more they relate to the elements of the same characteristic. When determining the reliability level of a scale, calculation of the Cronbach alpha coefficient is recommended for situations where the item scores are continuous in the 'item analysis' (Likert-type).[37] To calculate the internal consistency coefficient of GPS, which is a Likert-type scale, the Cronbach alpha coefficient was assessed in this study. The internal consistency reliability coefficient of the 33-item GPS was 0.95 and the scale was found to be highly reliable. The internal consistency reliability coefficients of the subscales ranged between 0.89 and 0.93. Although an internal consistency coefficient of 0.70 is considered acceptable for nursing researches, it has been reported that scales with an alpha coefficient between 0.60 and 0.80 are quite reliable.[34] When this is the case, it can be said that the items in the scale are consistent with each other and they relate to the elements of the same characteristic. In other words, the homogeneity of the scale is at a satisfactory level.

In the original validity and reliability study of the scale, the Cronbach's alpha was 0.89 and the Cronbach alpha of the subscales ranged between 0.72 and 0.96. The scale and its subscales showed a higher internal consistency level in this study compared to its original version. We think that this situation may have arisen from the nature of the pain experienced by the patients and intercultural differences.

The reliability coefficient obtained through the method of dividing a scale into two halves is known as the equivalent split-half reliability. The calculation of this coefficient can be done for the entire scale if it is a single scale or for its subscales considering each subscale as a whole in itself if it has subscales. It is the most frequently used method for determining a scale's reliability. To obtain the reliability coefficient for the whole test, an equation

developed by Spearman Brown is used.[35] In the split-half reliability analyses of GPS, the Cronbach alpha coefficient, Spearman-Brown coefficient and Guttman Split-Half coefficient were found at high levels. These results show that the scale has acceptable internal consistency and is reliable.

An EFA was performed for the construct concept validity. A factor analysis is based on the correlations of the items with each other and is a procedure used to evaluate whether or not the scale items can be grouped under various subscales. There are various methods for determining the number of factors in EFA. From these, the one used most often is the technique known as the Kaiser-Guttmann rule, which involves including factors with an eigenvalue greater than 1. The criterion in determining which item belongs to which factor is the factor-load showing the degree of relationship between a factor and the item. When performing a factor analysis, the consistency and adequacy of the sample should be taken into account. The adequacy of the sample is decided by looking at the KMO value when conducting. For a good factor analysis, the KMO value is desired to be over 0.80.[35]

We found that the sample adequacy analysis value calculated as the KMO value in this study was quite adequate for a factor analysis. The results obtained show that the sample size worked on was adequate for conducting a factor analysis and the data were appropriate.

The study has limitations as it was done at a single centre, and some patients were having effective treatment while others were not having effective treatment and were in search of some new treatment. The data-collection tools also led to subjective data which is another limitation of the study.

We, however, recommend using GPS in different chronic pain syndromes.

Conclusion

GPS was found to be a measurement tool with adequate validity and reliability indicators and can be used with confidence in Turkey for assessing both physical and psychological pain-related experiences of patients with chronic pain and their clinical outcomes.

Disclaimer: None.
Conflict of Interest: None.
Source of Funding: None.

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