



# Validity and Reliability of the Persian Version of the Chronic Pain Grade Questionnaire in Patients with Musculoskeletal Pain

Ali Soleymani <sup>1</sup>, Abbas Masjedi Arani <sup>1\*</sup>, Seyed Ahmad Raeissadat <sup>2</sup>, Mohammad Hassan Davazdahemami <sup>1</sup>

<sup>1</sup> Department of Clinical Psychology, Shahid Beheshti University of Medical Sciences, Tehran, Iran

<sup>2</sup> Department of Physical Medicine and Rehabilitation, Shahid Beheshti University of Medical Sciences, Tehran, Iran

\*Corresponding author: Abbas Masjedi Arani, Department of Clinical Psychology, Shahid Beheshti University of Medical Sciences, Tehran, Iran  
E-mail: masjedi.sbmui@yahoo.com

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## Abstract

**Introduction:** Chronic pain which is a pain that remains or repeats for more than 3 to 6 months affects one in every 10 people in the world. Rising direct and indirect costs of chronic pain show the importance of researches which help to find better ways of pain management. Testing the validity and reliability of pain measurement tools in different populations can help this kind of researches. The chronic pain grade questionnaire is devised by Vonkorf and his colleagues. This seven-item instrument gives a score which empowers chronic pain patients to be characterized into one of four hierarchical categories according to pain severity or interference. The goal of this research was to test the validity and reliability of the Persian version of the chronic pain grade questionnaire.

**Methods:** As a cross-sectional study after downloading the questionnaire from the internet and translating from English to Persian by researchers and backward translation by a native researcher, it was answered by 204 patients with musculoskeletal pain. These patients were referred to the physical medicine and rehabilitation clinic in Modarres Hospital and were registered using convenience sampling method. Patients were aged between 18 and 87; suffering from musculoskeletal pain (including primary and secondary pains) for at least the last 6 months. Fifty patients were reevaluated after two weeks.

**Results:** As a result of testing reliability, Cronbach's alpha was 0.89 and the Guttman split-half coefficient was around 0.82 and Test re-test coefficient using Spearman's correlation coefficient was 0.89. Only a single component was extracted for the questionnaire, as a result of factor analysis. This component defines 59.8% of the variance.

**Conclusions:** In summary, construct validity and reliability of the Persian version of the chronic pain grade questionnaire are approved, therefore it would be applicable to people with musculoskeletal pain in the Iranian population.

## INTRODUCTION

As indicated by the International Association for the study of pain (IASP), pain is "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage [1]. Pain has been portrayed in the worldwide literature as a symptom of the modifiable disease, injury, or trauma; and when chronic, pain is presumed to mirror a disappointment of the treatment of the basic disease process. but, 8 of the top 12 disabling non-communicable diseases (NCD)—low back pain (LBP), neck pain, migraine, arthritis, other musculoskeletal (MSK) conditions, depression, anxiety, and drug use

disorder—are all either pain conditions or psychological conditions firmly related to chronic pain and often have no clear starting event [2]. Normally, pain is viewed as chronic when it remains or repeats for more than 3 to 6 months [3]. Chronic pain affects 10% of the global population. One in every 10 individuals develops chronic pain every year around the world. However, like the general distribution of the worldwide prevalence of the disease, risk factors for chronic pain and management choices are distributed unequally between high, low and middle-income countries (LMICs), with lower income ones suffering from more elevated levels

of chronic pain and lesser probability of advantageous treatment [4]. In Iran, as indicated by Mohammadzadeh and his colleagues, the average estimated prevalence of chronic pain in different areas of Tehran was 0.25.5 and an expansive heterogeneity was seen in its prevalence. Prevalence of chronic pain was significantly higher in married housewives, retirees, and pensioners and was significantly related to age, educational status, depression, and anxiety [5]. In the U.S., direct expenses from low-back in 2012 were \$300 billion every year, with an extra \$335 billion in light of disability and lost productivity. Furthermore, increased prescription of opioids and benzodiazepines to treat pain and anxiety/insomnia has led in parallel to exceptional increments in mortality from accidental overdose [4]. Such costs and consequences of chronic pain justify the importance and necessities of making instruments for precise measurement of chronic pain, which can lead to finding more effective treatments. Testing the validity and reliability of each tool of measurement in any society is one of the top priorities which help for better practice of that tool and conducting useful researches in pain management. There are different ways for pain measurement, one of which is using questionnaires. There are lots of pain questionnaires like the McGill pain questionnaire, West Haven-Yale Multidimensional Pain Inventory (WHYMPI) and the Brief Pain Inventory. The McGill pain questionnaire consists of 3 main classes of word descriptors - sensory, affective and evaluative - that are utilized by patients to determine subjective pain experience. It likewise contains an intensity scale and some different items to measure the properties of the pain experience. [6]. Khosravi and his colleagues in Iran demonstrated the cultural adjustment and reliability of this questionnaire for Persian chronic pain epidemiological researches. They reported that total Cronbach's alpha (n=84) was 0.85 and the reliability coefficient for all domains was more than 0.80, respectively [7]. West Haven-Yale Multidimensional Pain Inventory (WHYMPI) is an inventory with three parts that is comprised of 12 scales, examining the effect of pain on the patients' lives, the responses of others to the patients' communications of pain, and the extent to which patients participate in common daily activities [8]. Mirzamani showed the validity of this inventory among patients with chronic pain in Iran and reported Cronbach's alpha of the first (0.86), second (0.78) and third (0.75) part. They reported that retest reliability was 0.95 [9]. The Brief Pain Inventory (BPI) measures two dimensions: the intensity of the pain (sensory dimension) and interference of pain in the patient's life (reactive dimension). It also asks the patient about pain relief, pain quality, and patient impression of the reason for pain [10]. Vakilzadeh and Nakhae reported that the Persian version was compatible with the original version. Cronbach's alpha for the whole questionnaire (11 items) was 0.87 and it was 0.87 and 0.89 for the intensity and reactive dimensions, respectively [11].

This research tested the validity and reliability of the Persian version of another questionnaire named Chronic Pain Grade Questionnaire (CPG) that is devised by VonKorff and his colleagues [12]. VonKorff et al proposed the measurement of chronic pain severity in three dimensions: persistence (duration), intensity, and disability. They devised a simple questionnaire based on measures of pain intensity and pain-related disability and showed its validity in the USA in interview-based research on patient samples suffering from back pain, headache, and temporomandibular disorder pain. This seven-item instrument gives a score which empowers chronic pain patients to be characterized into one of four hierarchical categories according to pain severity or interference. These four classes are Grade I, low disability-low intensity; Grade II, low disability-high intensity; Grade III high disability-moderately limiting; and Grade IV, high disability-severely limiting. The CPG includes sub-scale scores for typical pain intensity and disability score and disability points [13]. VonKorff showed that Cronbach's alpha of CPG is more than 0.90 and this questionnaire has a good level of reliability [12]. Smith showed that Cronbach's alpha was 0.90 and item-total correlations were all high, demonstrating good internal consistency and reliability. Validity was confirmed by psychometric testing, including confirmatory factor analysis. Good correlations with comparable dimensions of the SF-36 general health questionnaire affirmed convergent validity. Construct validity was affirmed by testing scores against the duration of pain and treatment looked for pain [13]. This questionnaire is easy to complete and its brevity makes it a fascinating instrument if correctly used. It measures pain intensity and severity and differentiates patients who are significantly disabled from those who are not disabled because of the pain. This questionnaire needs to be translated and adapted for use in different cultures and population [14]. The reliability and validity of this questionnaire are reported in some other non-English versions. According to the results of testing the Italian version the Chronic Pain Grade Questionnaire, internal consistency was assessed by the Cronbach's alpha coefficient. Construct validity was analyzed by performing a principal component factor analysis and by comparing CPG dimensions and subscales with the SF-36 questionnaire. Discriminant validity was assessed by comparing the CPG and SF-36 dimensions in patients with and without other health conditions. Factor analysis showed two factors which accounted for 76.4% of the variance of the questionnaire. Item-total correlations for the subscales were moderate up to high (from 0.50 to 0.77). In comparison with the SF-36, the expected correlations were found when comparing items measuring similar constructs, showing convergent construct validity. Discriminant validity, assessed by comparing the CPG dimensions in patients with and without other health conditions, showed that the CPG shows moderate

association with the presence of comorbidities. Furthermore, the CPG Disability Score was inversely correlated ( $p=0.01$ ) to years of formal education. According to the findings, the Italian version of the CPG questionnaire valid and reliable for evaluating the severity of chronic musculoskeletal pain [14]. The reliability and validity of the German version of this questionnaire are assessed and according to the results, factor analysis yielded two factors which accounted for 72% of the variance of the questionnaire. The CPG and its subscales show moderate to high correlation with other instruments measuring the patient's disability (FFbH-R, Pain Disability Index PDI). Furthermore weak to moderate, but significant correlations were found between the CPG and other measures of grading and staging chronic pain (MPSS, RGS). positive correlations between the CPG and both, the frequency of doctor visits and the frequent use of pain medication have been seen [15].

## METHODS

In a cross-sectional study design and according to the goal of this research we tested the validity and reliability of the Persian version of the chronic pain grade questionnaire in patients with musculoskeletal pain. We tested the reliability of this questionnaire by Cronbach alpha and Guttman's split-half coefficient. We also measured the test re-test coefficient using Spearman's correlation coefficient. The construct validity of this questionnaire was tested by exploratory Factor analysis after Kaiser-Meyer-Olkin and Bartlett's test of sphericity showed the adequacy of data for factor analysis. Authors translated the Chronic Pain Grade questionnaire from English to Persian after downloading it from the internet and 4 medical experts in physical medicine and rehabilitation checked the translated version. However, to enable comparison between assessments made in different countries, not only does this questionnaire need to be translated but also to be adapted for use in different cultures. We report on the linguistic validation of a Persian version of the CPG questionnaire. The pretest of the final Persian version administered on 25 patients referred to physical medicine and rehabilitation clinic of Modares hospital. We used a convenience sampling method. Participants were patients who were referred to physical medicine and rehabilitation clinic at

Modarres Hospital suffering from musculoskeletal pain (including primary and secondary pains) for at least the last 6 months. Inclusion criteria were: age above 18, being able to read and suffering pain in the last 6 months at least. Exclusion criteria were: patients who answered the questionnaire incompletely or gave two or more answers to a single item on their questionnaire. 236 patients answered the questionnaire and 204 men and women with chronic musculoskeletal pain (including primary and secondary) were chosen as a sample. The rest of the patients (32 patients) did not answer all 7 questions in the questionnaire. After administering the Persian version the Chronic Pain Grade questionnaire, it was re-administered on 50 patients after two weeks. Some studies have shown that though the best time-interval between testing will differ depending on the construct being measured, on the stability of the construct over time and on the target population, the target time of two weeks is the most frequently recommended interval [16]. These patients were randomly chosen for re-administration phase.

## RESULTS

71 out of 204 patients who participated in this research were men (34.8%) and 133 patients were women (65.2%). The youngest patient was 18 years old and the oldest was 87 (Mean:  $54.6 \pm 15.4$ ).

### Reliability

As a result of testing reliability of the chronic pain grade questionnaire, Cronbach alpha was 0.87 and Guttman's split-half coefficient was 0.82, respectively. The corrected Item-total correlation was low only in item 4 and as it's shown in Table-1, if that item was deleted; Cronbach's alpha would rise up to 0.89.

### Validity

Kaiser-Meyer-Olkin's measure of sampling adequacy (0.82.6) and Bartlett's test of sphericity ( $P < 0.001$ ) showed the adequacy of data for factor analysis. Exploratory factor analysis is used to determine validity. Only a single component was extracted as a result of factor analysis. This component defines 59.8% of the variance as it's shown in Table 2. Factor loadings for each of the 7 items are shown in Table 3. Items 4 and 5 have the lowest and highest factor loadings as it's shown in Table-3.

**Table 1:** Chronic Pain Grade: Item-Total Correlations

Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
32.3333	162.371	0.583	0.370	0.880
32.2108	154.896	0.672	0.603	0.870
32.9951	148.360	0.740	0.660	0.861
38.2451	190.846	0.398	0.211	0.898
32.8382	137.397	0.822	0.728	0.850
32.8873	139.460	0.736	0.646	0.863
33.3137	142.620	0.806	0.727	0.852

Retest coefficient was 0.89 as it was measured using Spearman's correlation coefficient.

**Table 2:** Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	Variance, %	Cumulative, %	Total	Variance, %	Cumulative, %
1	4.189	59.841	59.841	4.189	59.841	59.841
2	0.967	13.818	73.659			
3	0.648	9.262	82.921			
4	0.523	7.472	90.394			
5	0.258	3.686	94.080			
6	0.238	3.400	97.480			
7	0.176	2.520	100.000			

Extraction Method: Principal Component Analysis.

## DISCUSSION

The present research was conducted to test the validity and reliability of the Persian version of the Chronic Pain Grade CPG. Participants in this research were patients with musculoskeletal pain (including primary and secondary) who were referred to physical medicine and rehabilitation clinic at Modares hospital, Tehran, Iran. Testing the validity we used Cronbach alpha, split-half coefficient, and Spearman's correlation coefficient. The first psychometric test we used to determine the reliability is used in former researches about CPG too. Cronbach alpha for all 7 items was 0.87 which shows good reliability of the Persian version of the chronic pain grade questionnaire. According to many studies, Cronbach alpha above 0.70 shows acceptable reliability but good reliability is affirmed when Cronbach alpha is greater than 0.80 [17]. Comparing English and Persian versions of the chronic pain grade questionnaire, results of testing reliability with Cronbach alpha are almost the same. Vonkorff and Smith reported 0.90 and 0.91 reliability for CPG, respectively using this psychometric test [12, 13]. Furthermore, Smith and his colleagues reported good Item-total correlation for all 7 items as a measure of internal consistency, while we reached a poor correlation between item 4 and total correlation and if this item was deleted it would rise up Cronbach's alpha. Item 4 is asking a question about days in the last six months that the patient has been kept from his/her usual activity (work/school/housework) because of pain and it should be noted that the answer of this question is affected by the meaning of being kept from activity and economic and social consequences which is different in each society and the answer is not merely affected by pain intensity. In the English version the lowest Item -Total correlation was 0.68 for item 2, a measure of pain intensity in the last 6 months [13]. Comparing Cronbach alpha in Persian and other non-English researches about CPG, 0.86 and 0.82 reliability were reported in Italian and German versions, respectively which are almost close to the Persian version. Furthermore, in the Italian and German version of CPG, the lowest Item-total correlation was 0.50 and 0.36, respectively for item 1, a measure of current pain intensity [14, 15]. Guttman's split-half coefficient as the second psychometric test we used to determine the

reliability of the Persian version of CPG was 0.82 which approves good reliability. Spearman's correlation coefficient after a re-administration phase of 50 patients was 0.89 which shows good reliability too. We used exploratory factor analysis for testing the validity of the Persian version of the CPG. This method is used for determining validity in Italian and German versions too. In comparison with other non - English version, factor analysis yielded two factors in both Italian and German version which accounted for 76% and 72% of the variance of the questionnaire, respectively [14, 15]. But in the Persian version of the CPG only one factor extracted in factor analysis which accounted for 59.8% of the variance of the questionnaire. Smith and his colleagues reported that factor analysis identified only one relevant factor in English version too. They reported that their factor analysis identified one relevant factor corresponding to an eigenvalue of 4.8, whereas all other factors had eigenvalues less than 0.85. All seven questions included in this analysis had a factor loading greater than 0.75, therefore all contributed substantially to the variance explained by this factor [13].

**Table-3:** Component Matrix

Component 1	
s5	0.884
s7	0.871
s6	0.824
s3	0.819
s2	0.766
s1	0.686
s4	0.493

Extraction Method: Principal Component Analysis (PCA)

Considering all these differences and similarities, the results show good validity and reliability of the Persian version of the chronic pain grade questionnaire and in conclusion, this questionnaire can be used for patients with musculoskeletal pain in Persian populations. All patients participated in this research with informed consent and the research is approved by the research ethics committee of Shahid Beheshti University of Medical Sciences (see acknowledgment). This research contained some limitations; the most important one of

which was the difficulty of asking patients to refrain from using painkillers which can affect the patient's answers in a Retest phase. The convenience sampling method as a type of non-probability sampling was another important limitation. For future researches, using a larger sample size for better external validity and using different methods to determine validity can be considered.

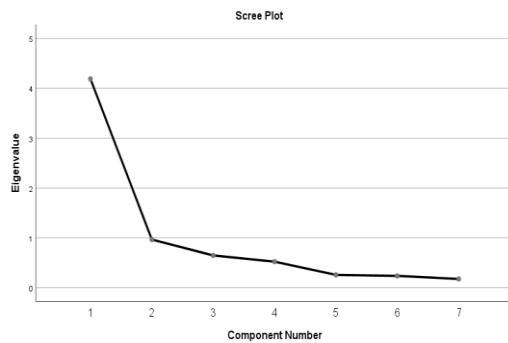


Figure 1. Scree Plot of Factors

## CONCLUSIONS

According to our results, the Persian version of the chronic pain grade questionnaire has good validity and reliability to be used for Iranian patients with chronic musculoskeletal pain.

### Ethical Consideration

All procedures performed in the present study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee. Informed consent was obtained from all individual participants included in the study.

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### Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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### Authors' Contribution

Ali Soleymani collected the data. Ali Soleymani wrote the manuscript with support from Abbas Masjedi Arani,

Seyed Ahmad raissadat and Mohammad hasan davazdahemami. Seyed Ahmad raissadat and Ali Soleymani analyzed the data of this research. Abbas masjedi Arani supervised the research.

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