RESEARCH ARTICLE

The Chronic Pain Grade Questionnaire: validity, reliability and responsiveness in Greek chronic hip pain sufferers

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Abstract

Background: The Chronic Pain Grade Questionnaire (CPGQ) was developed to assess the global severity of chronic pain based on pain intensity and pain-related disability. This study aimed to translate, culturally adapt, and validate the Greek version of the CPGQ (CPGQ-Gr).

Methods: Adaptation into Greek followed established guidelines. We invited orthopedic outpatients suffering from chronic hip pain to participate in the study. The validity, reliability, and responsiveness of the CPGQ-Gr were assessed.

Results: Factor analysis yielded two factors (subscales), disability score (DS) and characteristic pain intensity (CPI). CPGQ-Gr items, total and subscale scores were highly correlated with the 12-Item Short Form Health Survey (SF-12) physical component summary score, and slightly correlated or not correlated with the SF-12 mental component summary score. Cronbach's alpha correlation coefficients for the CPGQ-Gr total scale, DS, and CPI subscales were 0.90, 0.95, and 0.83 respectively. All measures showed excellent temporal stability (intraclass correlation coefficients of 0.84, 0.92, and 0.91, respectively). Cliff's delta effect sizes ranged from 0.47 to 0.82. The values of the area under the receiver operating characteristic curve were consistent with good to excellent discriminatory ability (range: 0.747-0.902).

Conclusion: Our findings suggest that the Greek version of the CPGQ is a valid, reliable, and sensitive to changes, instrument for grading the severity of chronic hip pain. HIPPOKRATIA 2018, 22(1): 37-42.

Keywords: Chronic pain, questionnaire, Chronic Pain Grade Questionnaire, quality of life, grading, disability, pain, validation

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Introduction

Chronic pain impinges on approximately 20 % of European adults and undermines health status, quality of life, work and functioning, imposing an enormous economic strain on society[1]. It is a complex and subjective experience involving biological, psychological, and social aspects that presents several measurement challenges. A multidimensional subjective tool of severity is needed to facilitate research, clinical practice, and treatment outcomes[2].

The Chronic Pain Grade Questionnaire (CPGQ) assesses the global severity of chronic pain based on intensity and disability[3]. It provides a categorical grading scheme and numerical self-rating scores for pain intensity and disability, allowing for qualitative changes in chronic pain over time to be analysed[3]. CPGQ was designed before the WHO International Classification of Functioning, Disability and Health (ICF)[4]. However, a recent study showed that it measures all the ICF outcomes, i.e., impairment, activity limitations, and participation restrictions[5].

The CPGQ was originally validated to be used in telephone interview-based research for patients with back pain, headache, and temporomandibular joint pain[3]. Further research extended its applicability as a self-completion questionnaire in the general population and chronic musculoskeletal pain[6]. It is brief, easy to understand and complete, and requires minimal training[6,7]. It has been adapted into English (UK), German, Italian, Chinese, Brazilian Portuguese, and Spanish languages and is available from the original reference and/or by contacting the authors directly[3,6-12].

Until now there was no reliable, sensitive to change and valid self-report tool available in Greek language, as brief, easy to understand, and complete as the CPGQ. A culturally adapted Greek version of the CPGQ would aid the study of chronic pain and its implications in the Greek population and promote cross-cultural comparisons. This study aimed to evaluate and report on the psychometric properties of a Greek version of the CPGQ (CPGQ-Gr).

Material and methods

Subjects

From February 2017 to January 2018, we conducted a prospective observational study to translate, cross-culturally adapt, and validate the CPGQ. After getting approval from the Scientific Council of the General Hospital Asklepieio Voulas (242/30-04-2014), we invited consecutive eligible orthopedic outpatients to participate in the study. We included eligible subjects, required to be at least 18 years of age and suffering from chronic hip pain (defined as persistent or recurrent hip pain for at least 12 weeks). The exclusion criteria were a severe systemic disease, psychiatric disorder, impaired cognition or dementia and mother language other than Greek. The sample size was calculated taking into account a 10:1 subject to item ratio and adjusting for a dropout rate of 20 %. In a three-month period, 112 subjects were assessed for eligibility, and 20 subjects met the exclusion criteria. All but five eligible subjects agreed to participate in the study. The study was registered with ClinicalTrials.gov (U.S. National Library of Medicine, Bethesda, MD, USA)[13].

Questionnaires

All 87 subjects received a questionnaire on demographic and socioeconomic data, the CPGQ-Gr, and the 12-Item Short Form Health Survey version 2 (SF-12v2). Age, gender, comorbid conditions, educational level, marital status, and employment status were recorded. We used the SF-12v2 to assess the construct validity of the CPGQ-Gr.

The CPGQ comprises seven items[3]. The responses on the seven items are utilized for computing the scores for the three subscales of the CPGQ. The subscales are characteristic pain intensity (CPI), disability score (DS), and disability points (DPs)[3]. The respondent's chronic pain and disability status can then be classified into one of the four hierarchical categories of chronic pain/disability. These are low disability and low intensity (Grade I), low disability and high intensity (Grade II), high disability and moderately limiting intensity (Grade III), high disability and severely limiting intensity (Grade IV)[3].

The CPGQ-Gr (Appendix I) was identical to the original English version in terms of instruction and format. Adaptation into Greek language followed established guidelines[14]. A medical doctor and a chronic hip pain sufferer translated the questionnaire into Greek language. Both were bilingual, aware of the objective of the questionnaire and urged to aim for semantic rather than a literal translation. Two bilingual professionals who had no prior knowledge of the instrument translated the questionnaire back into English. An expert committee (three pain management specialists, a methodologist, forward and backward translators) produced a provisional version of the CPGQ-Gr. Fourteen patients of the target group completed the provisional version in one-to-one interviews. This preliminary field testing indicated that the adapted version appeared to retain its equivalence to the original.

The 12-Item Short Form Health Survey (SF-12) is a widely used generic health-related quality of life questionnaire (OptumInsight Life Sciences, Inc., Massachusetts, USA)[15]. All 12 items are used to calculate the physical component summary (PCS-12) and the mental component summary (MCS-12) by applying a scoring algorithm[16]. The validity and sensitivity of the SF-12 summary scores have been demonstrated in the Greek general population[17]. A license for the use of SF-12v2 was obtained from OptumInsight Life Sciences, Inc. (license number: QM039822).

Procedure

All 87 subjects completed the questionnaire set in random order at *t*1 (initial interview). The CPGQ-Gr was re-administered to all patients after 48h *(t*2). A subgroup of 29 patients who underwent total hip replacement surgery completed the CPGQ-Gr, and reported their improvement six months postoperatively (*t*3). They reported their improvement using a dichotomous variable (Yes or No improvement).

Statistical analysis

Descriptive statistics and frequencies were computed. Significance was set at $p < 0.05$. The data were analyzed using the IBM SPSS Statistics for Windows, version 20.0 (IBM SPSS, IBM Corp., Armonk, NY, US).

Principal component factor analysis (PCA) with varimax rotation was carried out to explore the factor structure. Construct validity was examined by the degree the CPGQ-Gr items, total and subscale scores correlated with the SF-12 PCS and MCS scores [Spearman rank correlation coefficient (rho-ρ)]. Correlations between the SF-12 PCS score and the CPGQ-Gr which are believed to be comparable should be higher (convergent validity) than those of the SF-12 MCS score and the CPGQ-Gr which are believed to be less comparable (divergent validity). Internal consistency was assessed with the Cronbach's alpha statistic independently for each subscale and all items together (total scale). Test-retest reliability was assessed by calculating intraclass correlation coefficients (ICC), using a two-way random model with an absolute agreement definition. We used the percentage of patients who could complete the questionnaire by themselves and the time needed to complete it to test the operational feasibility of the CPGQ-Gr.

Experts do not agree on a single preferred approach to responsiveness assessment but recommend combining several approaches including both anchor-based and distribution-based methods[18-20]. There are two major aspects of responsiveness, internal and external. Internal responsiveness characterizes the ability of a measure to change over a prespecified time frame. External responsiveness reflects the extent to which a change in a measure relates to a corresponding change in a reference measure of clinical or health status[20]. We employed two approaches to examine the internal responsiveness of the CPGQ-Gr. First, Cliff's delta was calculated [$d = \#(x_1 >$

x_2) - #($x_1 < x_2$)/n_1n_2]. Cliff's delta is a standardized effect size, which makes no assumptions on the underlying distribution[21,22]. It has been shown to be robust in case of small to moderate sample sizes[22,23]. Second, we used the Wilcoxon signed-rank test in the 29 eligible subjects who underwent total hip replacement surgery to determine the statistical significance of the change in scores. Retrospective patient-reported global ratings of change are the most common anchors used for responsiveness analysis in pain research. We used a patient-reported retrospective global rating of change without reference to specific dimensions (Yes or No improvement in hip pain six months after total hip replacement surgery) as the reference standard for change in pain. The aim was to test whether the changes registered by a measure over time resemble those expected based on an external measure of health[20]. Cliff's delta effect sizes were calculated, and Wilcoxon signed-rank tests were performed to determine changes in the outcome measures for subjects in the patient-reported subgroups (improved, no improvement). Assessing responsiveness to change is analogous to assessing the discriminatory ability of a diagnostic test; therefore, receiver operating characteristic (ROC) curves can be used to assess a measure's ability to accurately "diagnose" the presence or absence of a clinically important change[24]. We calculated the area under the ROC curve (AUC) for each score using the above-mentioned patient-reported retrospective global rating of change as the anchor.

Results

The mean age was 67 years [standard deviation (SD): 9.34], 55.2 % were male, 19.5 % reported two or more comorbid conditions, and 82.8 % attained a secondary or tertiary level of education. The majority of the sample subjects was married and employed at the time of recruitment (86.2 % and 55.2 %, respectively). In the subgroup of patients who underwent total hip replacement surgery, the mean age was 67 years (SD: 9.16) and 55.2 % were female. Two or more comorbid conditions were reported by 24.1 % of the subjects. The majority of this subgroup had attained a secondary or tertiary level of education, was married and employed (82.7 %, 75.9 % and 51.7 % respectively). Table 1 summarizes data on sociodemographic and clinical characteristics of the sample.

Item 4 showed a skewed distribution and was excluded from PCA. PCA revealed a two-factor solution (eigenvalues 4.041 and 1.013). The first factor (items 5-7), DS, accounted for 67.35 % of the explained variance. It comprised items relating to the patient's rating of the grade of disability in daily life. The second factor (items 1-3), CPI, explained 16.89 % of the variance, representing the patient's rating of his/her mean pain intensity. The intercorrelation between the two factors was r =0.62 raising orthogonality concerns. The direct oblimin rotation method was applied (delta set at 0) but the analysis did not yield different results. In view of the factor analysis and textual considerations, we maintained both factors.

Higher significant correlations were found when comparing CPGQ-Gr items, total scale and subscales to the SF-12 PCS score. Non-significant or lower significant correlations were seen when comparing CPGQ-Gr items, total scale and subscales to the SF-12 MCS score. Negative correlations between the measures were found since high SF-12 component summary scores are associated with well-being, whereas high scores on the CPGQ-Gr indicate severe chronic pain/disability.

Cronbach's alpha was 0.90 for the total scale, 0.95 for the first factor (i.e., DS) and 0.83 for the second factor (i.e., CPI). ICC values for the total scale and the two-factor structure were: 0.84 [95 % confidence interval (CI): 0.75-0.89] for the CPGQ-Gr Grade (total scale), 0.92 (95 % CI: 0.87-0.95) for the CPGQ-Gr DS, and 0.91 (95 % CI: 0.86-0.94) for the CPGQ-Gr CPI. All subjects correctly completed the questionnaire, and there were no missing values. The mean time to complete the CPGQ-Gr was 5.56 min (SD: 1.34).

We noted statistically significant at the 0.001 level and large (Cliff's delta: 0.47-0.57) reductions pre- (*t*1) and postoperatively (*t*3) for the total scale and subscales. Statistically significant at the 0.001 level and large (Cliff's delta: 0.71-0.82) reductions pre- (*t*1) and postoperatively (*t*3) were also noted in the subgroup of patients who reported improvement. Non-significant changes were noted in patients who reported no improvement. AUC values were consistent with good to excellent discriminatory ability (range: 0.747–0.902).

Discussion

The present study aimed to analyze the psychometric properties of the CPGQ-Gr in chronic hip pain sufferers. Our findings suggest that the CPGQ-Gr is a valid, reliable, and sensitive to change instrument for grading the severity of chronic hip pain in terms of intensity and disability.

Earlier studies have reported either unifactorial or two-factor structures[3,6-8,11,12]. The factor analysis of our data yielded a two-factor solution accounting for 84.25 % of the explained variance. The first factor (DS, 67.35 % explained variance) represents the patient's perceived disability due to hip pain in major areas of daily life during the past six months. The second factor (CPI, 16.89 % explained variance) depicts the patient's mean pain intensity during the past three months. Both subscales and the total scale showed satisfying internal consistency. Cronbach alpha values for the DS and the CPI are the highest quoted in the literature[7,11,12]. The two subscales display a significant positive correlation (r =0.62). Earlier studies have reported comparable intercorrelations between the two subscales (r =0.45-0.58)[3,7,8,11,12]. Our data suggest that it is justified to apply both, the CPGQ-Gr Grade as a categorical measure as well as the DS and CPI subscales.

Construct validity was examined by the degree the CPGQ-Gr items, total and subscale scores were correlated with the SF-12 PCS and MCS scores. Inspecting the correlations across the two health status instruments yielded the expected results. Earlier studies have also

demonstrated higher correlations between the CPGQ and the SF-12 or SF-36 dimensions with a high ability to measure pain and physical health[6,7,11,25-29]. Correlations between the CPGQ and the SF-36 dimensions with a high ability to measure mental health have been shown to be lower[6,7,9,11,25-28].

The CPGQ-Gr Grade (total scale) and subscales (DS, CPI) showed excellent temporal stability. ICC values reported in our study were slightly higher than those previously reported[11,12]. Different test-retest intervals, chronic pain origin and/or course may account for this.

Our findings suggest that CPGQ-Gr responds to change in chronic pain among hip pain sufferers. All measures responded to patient-reported global improvement in chronic hip pain and accurately discriminated between subjects with and without improvement. The reference standard we used is imperfect. For example, patient-reported global rating of change is subject to "present state bias"[30]. If responders could not recall accurately how their pain was six months ago, then this would have led to recall bias. Exposure to an intervention may alter expectations in a way that influences the retrospective assessment of pain change. Nevertheless, patient-reported measures are the only valid tools we have to assess the inherently subjective phenomenon of pain.

Krebs et al studied primary care patients with persistent musculoskeletal of at least moderate severity pain[31]. They found that the CPGQ CPI and DS subscales were responsive to change and accurate in discriminating between subjects with and without improvement[31]. Keller et al previously reported comparable responsiveness of the CPGQ CPI and DS dimensions in an observational study of primary care patients suffering from arthritis or low back pain[32]. The CPGQ has been found to be an acceptable, valid and reliable instrument for measuring a change in chronic pain severity over time as a postal questionnaire for longitudinal studies[26]. In a study of individuals with chronic pain, poor measures of agreement and low correlations were found between the CPGQ Grade and responders' retrospectively perceived change in severity[33]. Both methods of assessment compared seem to provide different information, both of which are of considerable value[33]. They concluded that it would be useful, where possible, to use both methods of assessing change to provide comprehensive information on how pain is changing over time[33].

There are several limitations in interpreting our results. We recruited consecutive patients, without randomization. Only patients suffering from chronic hip pain were studied, and our results may not be generalizable to other patient populations or pain conditions. Including 87 patients may also be a limitation. There was no objective assessment of our study subjects. The argument remains, however, that the subjective interpretation of chronic pain is more meaningful than any objective measure, from the point of view of health service requirements[6]. Future studies implementing prospective longitudinal or interventional designs are necessary to establish the usefulness of the CPGQ-Gr as an outcome measure in clinical trials.

Table 1: Sociodemographic and clinical characteristics of the sample included in this prospective observational study.

	Sample (*t*1, *t*2) n =87	Sample (*t*3) n =29
Gender, n (%)		
Male	48 (55.2)	13 (44.8)
Female	39 (44.8)	16 (55.2)
Age (years)		
Mean (±SD)	67 (±9.46)	67 (± 9.16)
Range	50-90	50-88
Body mass index (kg/m$^{2)}$		
Mean (±SD)	30.12 (±5.2)	29.21 (±5.07)
Range	23.72-42.22	22.19-38.57
Marital status, n (%)		
Unmarried	3 (3.4)	1 (3.4)
Married	75 (86.2)	22 (75.9)
Divorced	3 (3.4)	2 (6.9)
Widowed	6 (6.9)	4 (13.8)
Educational level, n (%)		
Primary	15 (17.2)	5 (17.2)
Secondary	48 (55.2)	19 (65.5)
Tertiary	24 (27.6)	5 (17.2)
Employment status, n (%)		
Retired	39 (44.8)	14 (48.2)
Employed-office	24 (27.6)	9 (31)
Employed-manual	24 (27.6)	6 (20.7)
Number of comorbidities, n (%)		
1	58 (66.7)	14 (48.3)
2	12 (13.8)	6 (20.7)
3 or more	5 (5.7)	1 (3.4)

n: Number, SD: standard deviation.

In conclusion, our findings show that CPGQ-Gr is a valid, reliable and sensitive to change instrument for grading the severity of chronic hip pain. It is easy to understand and complete, and its brevity makes it an attractive instrument for use in clinical practice and research.

Conflict of interest

The authors declare that they have no conflict of interest.

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