

# PSYCHOMETRIC CHARACTERISTICS, CROSS-CULTURAL ADAPTATION AND VALIDATION OF THE SLOVENIAN VERSION OF THE VICTORIAN INSTITUTE OF SPORTS ASSESSMENTS FOR GLUTEAL TENDINOPATHY QUESTIONNAIRE (VISA-G)

## PSIHOMETRIČNE ZNAČILNOSTI, KULTURNA PRILAGODITEV IN VALIDACIJA SLOVENSKE RAZLIČICE VPRAŠALNIKA VISA-G (VICTORIAN INSTITUTE OF SPORTS ASSESSMENT FOR GLUTEAL TENDINOPATHY)

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### ABSTRACT

#### Keywords:

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**Introduction:** Greater trochanteric pain syndrome (GTPS) denotes several disorders around the lateral aspect of the hip. GTPS may develop in native hips as well as after total hip arthroplasty (THA). It is estimated that 5–12% of patients suffer from GTPS after primary THA. Despite the prevalence of GTPS, it is hard to diagnose and manage it properly. The VISA-G questionnaire was developed as a patient-reported outcome measurement tool for evaluation of GTPS. The aims of the present study were to evaluate the reliability of the VISA-G Slovenian and its construct and criterion validity.

**Methods:** After the finalization of the VISA-G Slovenian translation procedure, 59 patients with a painful trochanteric region planned for THA filled in the VISA-G Slovenian at the hospital on two occasions 5–7 days apart. On the first occasion, each patient also filled in the EQ-5D-5L questionnaire and the Harris Hip Score (HHS) was completed by the physiotherapist.

**Results:** The VISA-G Slovenian was found to have a test-retest reliability of ICC 0.977; 95% CI [0.96; 0.986]. Internal consistency was assessed with Cronbach's alpha 0.79. The statistically significant, but low, correlation between the HHS and VISA-G ( $r=0.48$ ) was obtained. Concurrent validity of the VISA-G with the EQ-5D-5L showed moderate to strong correlations in Mobility, Self-Care, Usual Activities, Pain, EQ-5D-5L Index and EQ VAS, but low correlation in the Anxiety subscale. No floor and ceiling effect were obtained.

**Conclusions:** The VISA-G Slovenian has excellent psychometric properties needed to measure gluteal tendinopathy-related disability of patients in Slovenia. Thus, we recommend using the questionnaire for measuring trochanteric hip pain.

### IZVLEČEK

#### Ključne besede:

kolki  
bolečinski sindrom v predelu velikega trohantra  
tendinopatija  
izidi  
psihometrične značilnosti

**Uvod:** Bolečinski sindrom v predelu velikega trohantra (angl. greater trochanteric pain syndrome, GTPS) opredeljuje številne motnje na lateralni strani kolka. GTPS se lahko razvije tako pri nativnem kolku kot sklepu z vstavljenimi totalno endoprotezo kolka (TPC). Po ocenah ima 5–12 % pacientov po primarni TPC težave z GTPS. Vprašalnik VISA-G je bil razvit kot orodje za vrednotenje GTPS. Namen naše raziskave je bil opredeliti zanesljivost, zgradbeno ter kriterijsko veljavnost slovenske različice vprašalnika VISA-G.

**Metode:** Po zaključku standardne procedure prevoda VISA-G v slovenski jezik, smo v raziskavo vključili 59 pacientov z bolečinami v pertohanternem predelu z znano artrozo kolka, ki so bili predvideni za vstavev TPC. Vsak pacient je slovensko različico vprašalnika VISA-G izpolnil v bolnišnici dvakrat v razmaku 5–7 dni. Ob prvem izpolnjevanju vprašalnika je vsak pacient izpolnil tudi vprašalnik EQ-5D-5L, fizioterapevt pa je ob tem izpolnil kolčni vprašalnik po Harrisu (angl. Harris Hip Score, HHS).

**Rezultati:** Za slovensko različico vprašalnika VISA-G smo ugotovili zanesljivost s področja ponovljivosti ICC 0,977; 95 % CI [0,960; 0,986]. Notranja skladnost vprašalnika je znašala 0,79, ocenjeno s Cronbach alfa. Statistično značilna, vendar nizka korelacija, je bila opredeljena med HHS in VISA-G ( $r = 0,48$ ). Konkurentna veljavnost VISA-G in EQ- 5D 5L je pokazala srednjo do močno korelacijo v mobilnosti, zmožnosti skrbni zase, izvajanju dnevnih aktivnosti, bolečini, indeksom EQ-5D-5L ter EQ-VAS, vendar nizko korelacijo z anksioznostjo. Učinka stropa in tal nismo zaznali.

**Zaključki:** Slovenska različica vprašalnika VISA-G ima odlične psihometrične lastnosti, potrebne za vrednotenje težav, povezanih z GTPS, pri pacientih z obrabo kolka v Sloveniji. Na podlagi naših ugotovitev priporočamo uporabo vprašalnika za vrednotenje trohanterne bolečine v predelu kolka.

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## 1 INTRODUCTION

Greater trochanteric pain syndrome (GTPS) is a term used for chronic lateral hip pain in the region of the greater trochanter (1). Formerly, it was generally regarded as trochanteric bursitis, and was first described in 1923 by Stegman (2). According to the current understanding, GTPS refers to several disorders around the lateral aspect of the hip, including trochanteric bursitis, tendinopathy and tears of the gluteus medius and minimus tendons (3). The aetiology of GTPS is still not fully understood. It is considered that the condition relates to a combination of myofascial pain and inflammation (4, 5). GTPS may develop in native hips as well as after total hip arthroplasty (THA). It is estimated that between 5–12% of patients suffer from GTPS after primary THA (5-7). In general, GTPS is around 4-times more common in women than in men (4, 8). Despite the significant reported prevalence of GTPS, its diagnosis and management remains challenging (1, 9). The main diagnostic modalities are ultrasound and high-resolution magnetic resonance imaging (1, 10). The GTPS is often resistant to conservative measures, but due to the lack of proper diagnostic methods it can also be challenging to treat surgically (3, 11-13). The evaluation of GTPS management outcomes was historically difficult in light of no condition-specific patient-reported outcome measurement tools. Considering GTPS as a tendinopathy involving the gluteus medius and gluteus minimus tendons, Fearon et al. developed the VISA-G questionnaire as a patient-reported outcome measurement tool for evaluation of GTPS (5). Victorian Institute of Sport Assessment (VISA) questionnaires have a consistent structure which is based on item response theory. Graded responses (responses reflect increasing difficulty) and VISA questionnaires have also been validated for assessment of lower limb tendinopathies (14-17). VISA-G was found to be a reliable and valid score reflecting the severity of GTPS-associated disability (18) as well as a good outcome assessment tool in patients undergoing hip abductor tendon repair (19). Due to the clinical importance of the GTPS, VISA-G has already been translated and validated into several languages (8, 20-22), but no Slovenian version is currently available. Therefore, the aims of the present study were to evaluate the reliability of the Slovenian version of VISA-G, its concept and the validity of its criteria.

## 2 MATERIALS AND METHODS

### 2.1 Target population

Patients were recruited at a single large elective orthopaedic hospital between July 2020 and March 2021. The inclusion criteria were: painful trochanteric region in patients with osteoarthritis of the hip joint planned for the THA replacement with varying degrees of trochanteric pain. GTPS was diagnosed based on the exact location of hip

pain, the ability to rest on the affected side, and presence of a limp on the affected side based on the severity of pain on palpation of the peritrochanteric region compared to inguinal pain. The exclusion criteria were: associated neurological lesions, systemic inflammatory diseases or psychiatric disease, lumbar spine nerve root signs.

### 2.2 Research design and procedure

The original English version of the VISA-G was first cross-culturally adapted for Slovenian speaking subjects.

All subjects filled in the translated Slovenian VISA-G questionnaire while in hospital with the two questionnaires 5 to 7 days apart. Filling in the questionnaire for the first time, each patient also filled-in the EQ-5D-5L questionnaire and the Harris Hip Score (HHS) was completed by a physiotherapist. The use of the EQ-5D-5L questionnaire was approved under the registration ID 38097. Patient age, gender, BMI and ASA score were collected as well. According to the COSMIN checklist reliability (internal consistency, test-retest reliability and measurement error), validity and floor and ceiling effects were evaluated (23, 24).

### 2.3 Cross-cultural adaptation

The guidelines for cross-cultural validation and adaptation of HRQoL measures were followed to prepare the Slovenian version (25). Two translators took part in the forward translation (i.e., into Slovenian), an orthopaedic surgery resident and a person without medical training (both Slovenian native speakers, fluent in spoken and written English). The translations were evaluated by an expert committee (physiatrist and the orthopaedic surgery consultant) to address discrepancies. Issues identified in the translation process were identified and resolved leading to the Slovenian version of the VISA-G questionnaire. Back translation was provided by a professional translator who worked independently, did not receive any information about the previous translation process and did not have any prior knowledge of the questionnaire. The back translation was evaluated and compared to the English original by the expert committee.

The pilot study consisted of cognitive interviews with the six patients affected by GTPS, and six patients without GTPS problems. The interviews were conducted to assess the harmonized version of the Slovenian VISA-G. The interviews were conducted by an expert medical professional from the same orthopaedic hospital. The notes were evaluated by the research committee. The final questionnaire was adapted in line with this revision. Firstly, each patient completed the Slovenian VISA-G questionnaire. Each patient was then interviewed to establish how they had interpreted the items. The results from the cognitive interviews were reviewed and a final

translated version of the Slovenian VISA-G questionnaire prepared.

## 2.4 Questionnaires

### 2.4.1 Three questionnaires were assessed: VISA-G, HHS and EQ-5D-5L

The VISA-G questionnaire consists of eight questions about the intensity of the hip pain and its implications for activities of daily living. In the first question, respondents are asked to identify the average intensity of hip pain, on a scale from 0 to 10, 0 meaning no pain and 10 meaning the worst pain. Questions 2 to 7 addressed the limitations pertaining to hip mobility in everyday activities. Subjects were asked to choose one out of five options based on the degree of their symptoms. The last question was divided into 3 sub-questions. Respondents only had to answer one of the 3 sub-questions about the current hip pain affecting their ability to undertake weight-bearing activities (e.g. walking, running, doing squats, shopping). The final VISA-G score was then calculated as a sum of answers to all 8 questions. At the end, respondents could achieve a score from 0, representing the worst, to 100 for the best clinical situation on the VISA-G score. The data from the VISA-G questionnaires were collected twice in order to compare the results of the VISA-G score.

The Harris Hip Score (HHS) was developed for assessment of the results of hip surgery, and it has been already adapted into Slovenian by Josipović et al. (26). The HHS is intended to evaluate various hip disabilities and methods of treatment in the adult population. The domains covered are pain, function and range of motion. The pain domain measures pain severity and its effect on activities and need for pain medication. The function domain consists of daily activities (staircase use, use of public transportation, sitting, and managing shoes and socks) and gait (limp, support needed and walking distance). The range of motion domain measures hip flexion, abduction, external and internal rotation, and adduction. Extremity length discrepancy is also noted. The HHS score gives a maximum of 100 points. The higher the HHS, the less dysfunction a respondent has. A total score of <70 is considered a poor result; a score of 70-80 is considered fair, a score of 80-90 is good, and a score of 90-100 is an excellent result.

For comparison with the VISA-G score, the EuroQol EQ-5D-5L questionnaire was taken into consideration. This questionnaire addresses five dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression (27, 28). Because no value set for this purpose was available for Slovenia at the time of our data collection, we used the value set for Germany, representing a closely resembling country as recommended (29).

## 2.5 Statistical analysis

Based on an expected reliability of 0.90, assuming the power of 0.8 and a significance level of 0.05, we calculated a total sample size of 49 symptomatic respondents that would be required for test-retest reliability (30).

The main focus of the paper is to assess the validity and reliability of the VISA-G questionnaire. The VISA-G reliability was assessed as internal consistency, test-retest reliability and measurement error. Internal consistency was determined through Cronbach's alpha. Test-retest reliability was evaluated using an inter-class correlation coefficient with two-random effects model, using single measures and absolute agreement. Measurement error was evaluated using: 1) the standard error of measurement (SEM) that was calculated as follows:  $SD(\text{Difference})/\sqrt{2}$ , where  $SD(\text{Difference})$  represents the standard deviation of the difference in scores on the two VISA-G indices and 2) the smallest detectable change (SDC) that was calculated as follows:  $\pm 1.96$  times the  $SD(\text{Difference})$  (31). Floor and ceiling effects were assessed and presented if the lowest or the highest score was achieved by more than 15% of cases (32). To assess construct validity the Spearman correlational coefficient was used, and correlations among the existing HHS and the VISA-G were computed. To assess concurrent validity, Spearman correlational coefficients (for variables not showing normal distribution) or Pearson correlational coefficients (for normally distributed variables) were calculated. The criteria used for the interpretation of ICC, Pearson's and Spearman's correlation coefficients were: 0.00-0.25, no correlation; 0.26-0.49, low correlation; 0.50-0.69, moderate correlation; 0.70-0.89, high correlation; and 0.90-1.00: very high correlation (33, 34). In all cases, a 0.05 significance level was used to determine the significance of the obtained results. Statistical analyses were performed using IBM SPSS Statistics 26 (IBM Corp., Armonk, NY).

## 3 RESULTS

### 3.1 Translation and cognitive interviews

No major problems were observed in the forward translations of the questionnaires and only minor discrepancies were discussed in the harmonizing process (see the section Questionnaires). The results from the interviews with six patients with GTPS and six patients without GTPS led to no major changes in the final questionnaire.

### 3.2 Patients and the total scores

A total of 59 patients were included in the sample. Characteristics of the patients are described in Table 1. The total scores of VISA-G, HHS and EQ-5D-5L questionnaires are presented in Table 2.

**Table 1.** Characteristics of the patients included in the sample, n - number of the patients included, BMI - body mass index, ASA - American Society of Anesthesiologists.

Patients (n=59)	
Age (years)	average (range) 66.54 (21-85)
BMI (kg/m <sup>2</sup> )	average (range) 29.05 (22-41.9)
Gender	
Women	34 (57.6%)
Men	25 (42.4%)
ASA score	
1st group	19 (32.2%)
2nd group	31 (52.5%)
3rd group	9 (15.2%)

**Table 2.** Total scores of VISA-G test-retest, HHS, EuroQol EQ-5D-5L, SD - standard deviation, SE - standard error.

Questionnaire	Average score	SD	SE	Range-(min-max)
VISA-G test	36.3	16.5	2.14	8-73
VISA-G retest	36.3	16.1	2.2	10-73
HHS*	60.3	15.7	2.1	28-87
EQ-5D-5L	0.56	0.21		-0.074-0.91

\* the distribution of the variable is close to normal (skewness=-0.42, kurtosis=-0.74)

### 3.3 Reliability and validity of the measurement instrument

Cronbach's Alpha showed excellent internal consistency 0.988. The test-retest reliability was excellent: ICC 0.977 (95 % [0.96; 0.986]). SEM was calculated to be 2.49. SDC was found to be  $\pm 6.901$ . No floor or ceiling effects were identified with less than 15% of participants scoring the minimum or maximum values.

The construct validity analysis showed statistically significant (at the 0.01 level) correlations among the HHS index and new VISA-G index ( $r=0.48$ ).

The criterion validity analysis showed statistically significant (at the 0.05 level) correlations among the items of EQ-5D-5L and new VISA-G index ( $-0.75 < \rho < -0.32$ ). The majority of correlations were high, and all of them had the expected sign; a higher score on VISA-G indicates better results, whereas for the five EQ-5D-5L dimensions, a higher score indicates more problems and worse health-related quality of life. The exception that did not correlate with other measures was correlation among VISA-G and the EQ-5D-5L anxiety/depression dimension.

## 4 DISCUSSION

The purpose of our study was to translate the VISA-G questionnaire from English into Slovenian, to conduct a cross-cultural adaptation to the Slovenian context and to assess the reliability and validity of the translated questionnaire (18).

The VISA-G questionnaire was developed to measure the disability associated with GTPS (5). The sample included in our study consisted of patients with hip osteoarthritis and GTPS, planned for hip replacement surgery. Considering the purpose of the study the coexistence of two pathologies including GTPS should not be considered as a limitation. A total VISA-G score of 36.3 (8-73) points was found, which is much lower than the score found in the validation analyses of the original English version (47.0 (42.6-50.2)) and Danish, Italian and French studies (8, 18, 20, 22). A possible explanation for observation of lower VISA-G compared to the previous studies could be that the average age of patients included in our study is about 10 years older than the age in previous studies (18, 20, 22). The total score of HHS was 60.3 (28-84), which is also lower than the score found in the validation analyses of the original English version (18). As patients with GTPS are very likely to have comorbidities such as pain generated from the back and hip joint, Fearon et al. suggested that the VISA-G score will likely be influenced by these (18). This is, however, already an inherent limitation of the original English version. We assume that the lower total scores of our cohort are because GTPS associated with hip

**Table 3.** Correlations (Spearman rho) between VISA-G index (1st assessment) and EQ-5D-5L scores among patients. Correl. Coef. - Spearman rho Correlation Coefficient.

		EQ-5D-5L scores under particular section					index
		mobility	self-care	usual activities	pain/discomfort	anxiety/depression	
VISA-G	Correl. Coef.	-0.698**	-0.620**	-0.711**	-0.635**	-0.324*	0.754*
	p-value	0.000	0.000	0.000	0.000	0.012	0.000

\* - Correlation is significant at the 0.05 level (2-tailed)

\*\* - Correlation is significant at the 0.01 level (2-tailed)

osteoarthritis since some activities evaluated with VISA-G may also be influenced by osteoarthritis. Thus, not only the soft tissue but also an intraarticular pathology impact on functional status, which is indicated with the lower HHS values.

The Slovenian version of VISA-G has demonstrated good internal consistency (Cronbach's alpha of 0.79). We did not find any floor or ceiling effects of the questionnaire. This psychometric property is important in regard to the discriminative power of the questionnaire as well as responsiveness.

We have also demonstrated excellent test-retest reliability with an ICC of 0.98, which is higher compared to the Danish (ICC of 0.96), Italian (ICC of 0.91) and the original English (ICC of 0.83) versions (8, 18, 20, 33, 34). A possible explanation for this difference is that the time interval between the two administrations of the questionnaire was shorter in our study (range 4-7 days) compared with the original study (range 7-47 days). Regarding SEM, we found a value of 2.49 points. The SEM means that  $\pm 1$  SEM (68% confidence) of the true score can be found between  $\pm 2.49$  points. The smaller the SEM is, the more confident we can be in the measured score. We also found an SDC of 6.90. This means that the overall score of participants has to change by 6.90 (on a scale from 0 to 100) to be considered a real change, and not a change due to measurement error. SEM and SDC of our sample were higher than the value found in the French version (SEM 1.64, SDC 4.55) (22). Higher SEM and SDC in our sample can be found because of the combination of comorbid disabilities and not only GTPS.

We found statistically significant (at the 0.01 level), but low, correlations among the existing HHS and VISA-G ( $r=0.48$ ). No significant correlation between the two scores was found in the original study (18). On this basis, Fearon et al. suggested that the HHS measures disability associated with bone and joint destruction in the hip and VISA-G likely measures constructs related to disability associated with soft tissue dysfunction around the hip (18). In our group, patients had hip osteoarthritis and GTPS which could explain the low correlation between VISA-G and HHS (5). The low correlation between VISA-G and HHS could indicate some inherent capacity of the two tools to discriminate between soft tissue and joint pathology.

Concurrent validity of the VISA-G with the EQ-5D-5L has not been investigated so far. Moderate to strong correlations were found between the VISA-G and the Mobility, Self-Care, Usual Activities, Pain, EQ-5D-5L Index and EQ-VAS, and expected low correlations were found between VISA-G and the Anxiety subscale. EQ-5D-5L offers a large variety of analyses, which are possible due to different domains of dysfunction analyses, and the advantage of the EuroQol approach is that it can be used for comparison with other diseases and to provide a utility index in cost-effectiveness evaluation.

## 5 CONCLUSION

The Slovenian version of VISA-G has excellent psychometric properties needed to measure gluteal tendinopathy-related disability of patients with hip osteoarthritis in Slovenia. Thus, we recommend using this questionnaire in the future for measuring hip pain.

### 5.1 What are the new findings

From previous research, we know that VISA-G is reliable in patients with GTPS without osteoarthritis, while with our study we know that VISA-G is a valid and reliable clinical and research tool for measuring the severity of disability associated with GTPS in patients with osteoarthritis in the Slovenian language.

### 5.2 How might this impact clinical practice in the near future

The Slovenian VISA-G provides an objective method of measurement of GTPS in patients with lateral hip pain with known hip osteoarthritis.

## CONFLICTS OF INTEREST

The authors declare no conflicts of interest about this study.

## FUNDING

The authors received no funding for this research.

## ETHICAL APPROVAL

The study protocol was reviewed and approved by the Valdoltra Orthopaedic Hospital Medical Ethics Committee on 14 July 2020, case No. 7-2020. All procedures performed in studies involving human patients were in accordance with the ethical standards of the institutional and/or national research committee and with the revised Helsinki Declaration 2013 and comparable ethical standards.

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