

# Iranian version of Pelvic Girdle Questionnaire: Psychometric properties and cultural adaptation

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**Background:** The Pelvic Girdle Questionnaire (PGQ) is a tool designed to evaluate pain and disability in pregnant women with pelvic girdle pain (PGP). This study was conducted with the aim of translating and determining the psychometric properties of PGQ in pregnant women in Iran. **Materials and Methods:** The present methodological cross-sectional study was conducted on 150 pregnant women living in Tehran in 2017. The original English version of PGQ was translated into Persian version after the permission of the tool designer using the back-translation method. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) methods were used to determine the construct validity, as well as Cronbach's alpha and intraclass correlation coefficient (ICC) to determine the reliability of the questionnaire. **Results:** The results of factor analysis showed that the study of this scale consists of two extracted subscales as activities and symptoms. EFA and CFA confirmed two factors that determined 70.22% variance. Furthermore, findings showed that high internal consistency with Cronbach's alpha = 0.961, for the total score of instrument and for the factors, ranged from 0.87 to 0.91. Cronbach's alpha symptoms and activities and total were 0.91, 0.87, and 0.87, respectively. ICC of symptoms and activities and total was 0.91 (95% confidence interval [CI]: 0.88–0.93), 0.81 (95% CI: 0.66–0.92), and 0.83 (95% CI: 0.68–0.93), respectively. **Conclusion:** The Persian version of PGP, as a valid and reliable tool, has the potential for studying and evaluating the activity and symptoms of PGP in pregnant women in Iran.

**Keywords:** Pelvic girdle pain, psychometric, questionnaire

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## INTRODUCTION

Pelvic girdle pain (PGP) is one of the most common problems of pregnancy that may lead to motor constraints and disabilities during and even after pregnancy.<sup>[1,2]</sup> About 45% of women during pregnancy and 25% of women after pregnancy suffer from pregnancy-related lower back pain and PGP.<sup>[3]</sup> The PGP is said to experience pain in the areas between the iliac crest bone and the gluteal fold, especially the sacroiliac joint, as well as the symphysis pubis dysfunction that may extend to the back of the thighs unilaterally or bilaterally.<sup>[4,5]</sup> The PGPs are multifactorial events affected by different conditions.<sup>[6]</sup> Therefore, no specific risk factor can be reported to develop the PGPs. Perhaps,

during pregnancy, physiological, and hormonal changes, the combination of lower back and pelvic pain at the beginning of pregnancy, poor marital relationships, multiparous pregnancy, job dissatisfaction, and stress are some of the effective factors developing PGP.<sup>[7-11]</sup> The PGP during pregnancy can be attenuated by either medication or multiple paraclinical interventions such as early pregnancy training to maintain the correct position of the body in daily activities, isometric exercises, water sports, physiotherapy, and sometimes acupuncture.<sup>[12,13]</sup> However, the low back pain can develop varying degrees of disability in an individual.<sup>[6,14,15]</sup> Considering the high frequency of low back and pelvic pains in pregnant women, examination of different types of low back and pelvic pains will lead to an appropriate

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diagnostic strategy based on the relative frequency of various types of low back pain. Consequently, appropriate and low-cost diagnostic and preventive therapies and reasonable approaches are needed to properly assess the interventions and reliable and valid measurements.

Current criteria are unable to describe enough problems and complications and exacerbating factors. Therefore, there is a need for a reliable, valid, and responsive measurement tool.

However, few studies have been conducted to evaluate the measurement of tools for patients with PGP. Pelvic Girdle Questionnaire (PGQ) is a new tool for measuring PGP in pregnancy.<sup>[16]</sup>

There is a need to create an integrated tool for PGP detection and management. This tool will be used to evaluate the treatments in PGP management in clinical trials. There are no tools or questionnaires validated to Persian that evaluate PGP.<sup>[17]</sup>

The PGP during pregnancy is one of the evaluation tools. Stuge *et al.* have designed PGQ collection tool, including two subscales of activity (20 items) and symptoms (5 items).<sup>[16]</sup> Assessing PGP during pregnancy along with physical care is best done during pregnancy to identify susceptible mothers and to prevent this disorder or the consequences using appropriate measures.

PGP is one of the world problems; therefore, validation of the questionnaire's equivalence in different countries is important and necessary so that the results of the studies can be compared in different languages.<sup>[18]</sup> Furthermore, the researchers recommend that in each culture, the questionnaire is adapted and its validity should be evaluated for the study of the measurement properties.<sup>[19]</sup>

The absence of PGP during pregnancy in Iran and consequently the lack of use of it in the care of this era is one. The challenge in screening this case, encouraging researchers to translate and psychometricize the PGP scale during pregnancy. It should be noted that the simplicity, short duration, and consideration of important evaluation criteria in this tool, on the one hand, and the designer's permission for its Persian translation, on the other hand, were of the reasons for choosing this tool for psychometric analysis. This study aimed to translate and determine the psychometric properties of PGP during pregnancy in Iran.

## MATERIALS AND METHODS

In the present methodological cross-sectional study, the psychometric properties of PGQ were evaluated for 150

pregnant women living in Tehran in 2017. The sample size was determined according to the number of items, hereby considering at least six samples for each item.<sup>[20]</sup>

The PGQ tool was translated and used after obtaining approval from the designer of the tool, Britt Stuge. Furthermore, the research was approved by the Ethics Committee of the Shahid Beheshti University (Code of Ethics: IR.SBMU.PHNM.1396.799).

### Characteristics of research units

Inclusion criteria were the informed willingness to participate in the research, Iranian nationality, PGP approval with the active left and right acro (active straight leg raise [ASLR]) and long dorsal sacroiliac (long dorsal sacroiliac ligament [LDL]) tests, gestational age >20 weeks, and no history of underlying acute and chronic disease (feeling any pain in a region other than the pelvis, history of pelvic fracture, any malignancy, inflammatory arthropathy, active urinary or intestinal infection, and neurological illnesses). Exclusion criteria were unwillingness to continue to cooperate and not respond to all questions of the questionnaire.

### Research tools

The collection tool of PGQ was designed by Stuge *et al.* in 2011, which includes two subscales of activity and symptoms. The subscale of activity contains 20 items and the subscale of the symptoms involves 5 items. The maximum score is 60 in the subscale of activity and 15 in the subscale of symptoms and the total score of the questionnaire is 75. The answer for each item is based on four-point Likert Scale.<sup>[21]</sup> The English version of the questionnaire was translated by two official translators in Persian, and a joint original version was gained from two Persian translated versions of the questionnaire. The resulting version was then re-translated into English by two native translators who were fluent in both Persian and English, and an English version was obtained. Two English transcripts obtained in the previous stage were matched by the research group with the original version of the questionnaire in terms of the concept. An English version was also sent to the original designer of the questionnaire to confirm the translation of the questionnaire into Persian in English. To make a preliminary assessment of the ability to understand the items, questions, concepts, interpretations, and perceptions of individuals, the Persian form of the questionnaire was introduced to 30 pregnant women with definite PGP. They were requested to express their opinions on being legible, clear, writing style and grammar, dictation of words, and ease of completing this tool. The ambiguities mentioned in the final Persian version were corrected after reviewing the completed questionnaires.

The PGP is diagnosed based on the clinical test of ASLR. To this end, the pregnant woman is placed in a supine position

while the legs are straight at a distance of 20 cm from each other. The pregnant woman is then requested to keep her legs up one after the other without bending the knee up to 20 cm above the bed and next asked about the discomfort during raising the leg (on both sides separately) to score as follows: no difficulties at all (0), minimal difficulties (1), somewhat difficult (2), fairly difficult (3), very difficult (4), and unable to raise the leg (5). The sensitivity and specificity of this test for detecting PGP in pregnancy were 0.87 and 0.94, respectively.<sup>[22]</sup> The pregnant women with a score of more than 0 were entered the study.

Other diagnostic tests for PGP include LDL test. In this test, the pregnant woman is positioned in the side lying and bending slightly both the hip and knee. The examiner placed in the bedside and touched her sacroiliac joint. If the touch causes pain that remains after the removal of the examiner for more than 5 s, it will act as a pain and if the pain disappears within 5 s, it will be recorded as tenderness. The sensitivity and specificity of this test for PGP detection were 0.86 and 0.98, respectively.<sup>[23]</sup> If the pain lasted more than 5 s, the pregnant woman would enter the study.

### Sampling method

Multistage random sampling was applied. First, using the categorical manner, the city of Tehran was divided into five geographic regions of North, South, East, West, and Center. The hospitals affiliated to the University of Medical Sciences were determined in each area. A hospital belonging to Shahid Beheshti University of Medical Sciences was selected from hospitals in each district having childbirth and maternity department. In every hospitals, using convenience sampling method, each pregnant mother who met the inclusion criteria was enrolled in the study as a participant after consenting to participate in the study.

### Data analysis

In the present study, the data were analyzed using SPSS version 20 (Armonk, NY: IBM Corp) and Lisrel version 8.8 software (Jöreskog and Sörbom 1996). The internal consistency was used to determine the stability of tool, as well as Cronbach's alpha and intraclass correlation coefficient (ICC) to determine the reliability of the questionnaire. The Cronbach's alpha coefficient was considered to be equal to or  $<0.7$ .<sup>[3]</sup> Repeatability or test-retest stability was investigated within 1 month by an expert on 15 pregnant women with PGP. The ICC method was two-way mixed and the ICC type was absolute agreement.

For ICC, a minimum reliability threshold of 0.70 is recommended.<sup>[24]</sup>

The standard error of measurement (SEM) indicates whether the measurement difference between the two tests

is real or due to the error of measurement. The minimal detectable change (MDC) can be defined as the smallest real change value. The equation standard deviation (SD)  $\sqrt{1-ICC}$  was used to calculate SEM and the equation standard error of mean  $\times z \times \sqrt{2}$  was used to calculate MDC.

### Construct validity

Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were applied to determine the construct validity. The sampling adequacy was considered by Kaiser-Meyer-Olkin (KMO) test, as KMO more than 0.7 was considered to be appropriate. In addition, the data correlation matrix was tested with Bartlett's test of sphericity with a significance level of 5%.

The loading value was considered at least 0.3 acceptable. The eigenvalues higher than 1 and explained variance above 0.5% are the basis for determining the factor.

The most common indicators of goodness of fit were provided for the model and evaluated using CFA. The normal distribution of the data was based on the skewness and kurtosis measures,<sup>[25]</sup> followed by Chi-square test for goodness of fit (standard values  $>0.9$ ), root mean square error root index (good:  $<0.08$ , moderate:  $0.08-0.1$ , and weak:  $>0.1$ ), comparative fit index (CFI) (standard values  $>0.9$ ), normed fit index (NFI) (standard values  $>0.9$ ), adjusted goodness of fit index (standard values  $>0.8$ ), and finally, the Normed Chi-Square (CMIN/DF).<sup>[26,27]</sup>

## RESULTS

### Descriptive statistics

The findings of this study on 150 pregnant women indicated that the mean and SD of women was  $29 \pm 5$  years, the mean and SD gestational age was  $32 \pm 5$  weeks, the mean and SD body mass index during pregnancy was  $26 \pm 3$ , and the mean and SD score of PGP was  $39 \pm 19$ . Approximately 36.6% of women ( $n = 55$ ) were homemakers and 63.4% of women ( $n = 95$ ) were employed. About 31.3% ( $n = 47$ ) of women had a history of low back pain before the pregnancy.

### Factor analysis

In the present study, the results of the EFA of the KMO test (for sample adequacy) were 0.953 and at a high level, the result of the Bartlett's test of sphericity was statistically significant ( $P < 0.001$ ). The results of factor analysis showed that the study of this scale by varimax rotation method, including two extracted factors, explained 70.22% of cumulative variance [Table 1].

In the CFA [Figure 1], the results of Chi-square test for goodness of fit were obtained first ( $df = 274$ ,  $\chi^2 = 1324.55$ ,

and  $P < 0.0001$ ). Other indicators were evaluated for fitting of the model. All indices, including non-NFI = 0.96, NFI = 0.94, parsimonious NFI = 0.86, CFI = 0.96, incremental fit index = 0.96, relative fit index = 0.94, and root mean square error of approximation = 0.160 confirmed the fitting fit for the final model. The results of the ICC, SEM, and the MDC with 95% confidence are presented in Table 2.

## DISCUSSION

The present study, for the first time in Iran, reviewed the psychometric evaluation and validation of the PGQ. The attained results supported the high reliability and credibility of the Persian version of the PG. The reliability of the Persian version of the PGQ is consistent with its original version as well as the psychometrics of the questionnaire was in line the French-Canadian and Spanish populations. The ICCs were 0.81 for the first domain and 0.91 for the second domain. Stuge *et al.* noted the ICCs of 0.93 in the first domain and 0.91 in the second domain.<sup>[16]</sup> Girard *et al.* by assessing the psychometrics of the PGQ in French reported the ICC of 0.841, and in the evaluation of construct validity with Oswestry Disability Index, Spearman's correlation

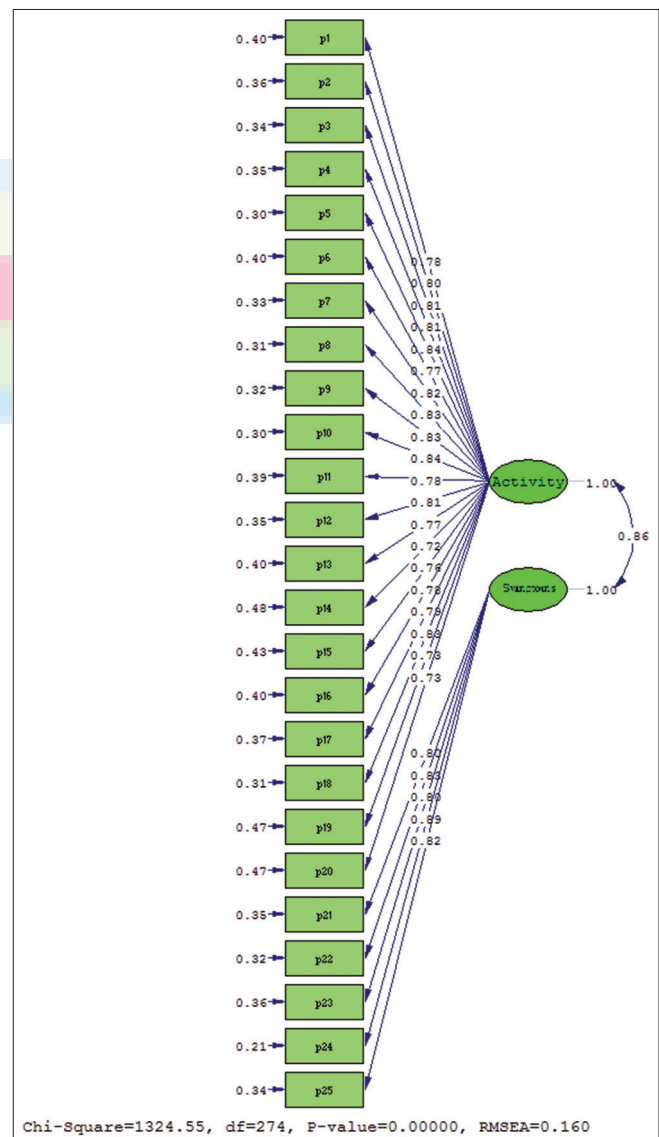
coefficient was 0.696.<sup>[18]</sup> Rejano-Campo *et al.* by evaluating the psychometric properties of the PGQ in Spanish showed that the correlation coefficient with Cronbach's alpha was 0.961 and the ICC was 0.962.<sup>[17]</sup>

The stress testing results of the tool, which was performed twice with an interval of a month, was at very good level, suggesting the stability of the results over time, which is consistent with the original version of the tool.<sup>[16]</sup> Therefore, Persian version of this tool has desirable reliability and validity in Iran, and it is useful to check the PGQ of Iranian pregnant women. The results of this study showed acceptable internal consistency for the factors. The EFA was used to examine the construct validity, which confirmed the two dimensions of activity and symptoms. The data analysis confirmed the appropriate fitness for the final model. The structure of the final model of PGQ was evaluated by two hidden factors with appropriate fitness, which is

**Table 1: Pelvic Girdle Questionnaire factors with varimax rotation method on 150 pregnant women with pelvic girdle pain in Tehran in 2017**

| PGQ scale items                                                        | Activity | Symptoms |
|------------------------------------------------------------------------|----------|----------|
| 1. While wearing your own clothes                                      | 0.627    |          |
| 2. Standing for <10 min                                                | 0.756    |          |
| 3. Standing for >60 min                                                | 0.580    |          |
| 4. Bending down                                                        | 0.645    |          |
| 5. Sitting down for <10 min                                            | 0.767    |          |
| 6. Sitting down for >60 min                                            | 0.643    |          |
| 7. Walking <10 min                                                     | 0.748    |          |
| 8. Walking >60 min                                                     | 0.729    |          |
| 9. Climbing stairs                                                     | 0.742    |          |
| 10. Doing housework                                                    | 0.759    |          |
| 11. Carrying light objects                                             | 0.823    |          |
| 12. Carrying heavy objects                                             | 0.772    |          |
| 13. Sitting down and standing up                                       | 0.643    |          |
| 14. Pushing a shopping cart                                            | 0.800    |          |
| 15. Running                                                            | 0.734    |          |
| 16. Doing sports activities                                            | 0.724    |          |
| 17. Lying down                                                         | 0.668    |          |
| 18. Weltering on the bed                                               | 0.741    |          |
| 19. Having normal sexual relations                                     | 0.720    |          |
| 20. Pressing an object with one leg                                    | 0.718    |          |
| 21. How much do you experience PGP in the morning?                     |          | 0.719    |
| 22. How much do you experience PGP at night?                           |          | 0.788    |
| 23. How much do you suddenly have trouble moving your legs due to PGP? |          | 0.676    |
| 24. Do you do things more slowly?                                      |          | 0.801    |
| 25. Is your sleep interrupted?                                         |          | 0.750    |

PGQ= Pelvic Girdle Questionnaire; PGP= Pelvic girdle pain



**Figure 1: Final structure of the Pelvic Girdle Questionnaire model**



**Table 2: Repeatability test results for control errors**

| Factors  | Mean±SD     | Cronbach's alpha | ICC  | 95% CI    | P       | SEM  | MDC   |
|----------|-------------|------------------|------|-----------|---------|------|-------|
| Activity | 29.69±12.42 | 0.87             | 0.81 | 0.66-0.92 | <0.0001 | 5.34 | 14.73 |
| Symptoms | 7.60±3.14   | 0.91             | 0.91 | 0.88-0.93 | <0.0001 | 0.94 | 2.59  |
| Total    | 37.30±14.93 | 0.87             | 0.83 | 0.68-0.93 | <0.0001 | 2.53 | 6.98  |

SeM=Standard error of measurement; SD=Standard deviation; ICC=Intraclass correlation coefficient; MDC=Minimal detectable change; CI=Confidence interval

consistent with the findings of the study by designer, Stuge *et al.*<sup>[16]</sup> One of the limitations of this study was the lack of psychometric evaluation of PGQ in the postpartum period. Other limitations of the present study are the lack of use of convergent validity. The strength of this study was to use two different clinical diagnostic tests to identify pregnant women. It is recommended to be conducted a study determining the PGQ fitness for pregnant women with and without PGP.

## CONCLUSION

The Persian version of the PGQ, as a valid and reliable tool, is capable of studying and evaluating the activity and symptoms of PGP in Iranian pregnant women.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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