

# Validation of Pregnancy Unique Quantification of Emesis and Nausea (PUQE) Score in a Turkish Population

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## ABSTRACT

**Purpose:** Nausea and vomiting of pregnancy (NVP) is a significant problem in the first trimester of pregnancy which may seriously affect quality of life. The Pregnancy Unique Quantification of Emesis and Nausea (PUQE) score is a useful tool to assess NVP severity. The aim of the study was to perform the Turkish validation of the PUQE scoring system.

**Methods:** A cross-sectional study was conducted in a single clinic between December 2023 and May 2025, involving pregnant women in their first trimester. The Turkish version of the PUQE questionnaire was developed using standardized translation and cultural adaptation guidelines. Participants completed the modified PUQE scale assessing nausea, vomiting, and retching over the past 24 hours. Statistical analyses included internal consistency (Cronbach's alpha), content validity, and correlation with clinical interventions (antiemetic and intravenous fluid use).

**Results:** Among 787 pregnant women enrolled, 40.7% reported symptoms of NVP. Participants with NVP had a significantly higher pre-pregnancy body mass index compared to those without NVP ( $p=0.001$ ), while other demographic variables showed no significant differences. The Turkish version of the PUQE scale demonstrated excellent internal consistency (Cronbach's alpha = 0.963). Corrected item-total correlations ranged from 0.81 to 0.91. PUQE scores were significantly associated with clinical intervention, including antiemetic use and intravenous fluid therapy ( $p<0.001$ ), supporting the scale's clinical validity.

**Conclusion:** The PUQE scale was successfully adapted and validated in the Turkish language. Since PUQE is a three-item tool that is easy to apply and use, validation and adaptation to Turkish was helpful to evaluate the severity of NVP in any Turkish population.

**Keywords:** Hyperemesis gravidarum, nausea, vomiting, validation study

## INTRODUCTION

Nausea and vomiting are common symptoms during pregnancy, typically beginning between the sixth and eighth weeks and often persisting until the sixteenth or even twentieth weeks.<sup>1</sup> These symptoms affect up to 70% of pregnant women, while the more serious form of nausea and vomiting of pregnancy (NVP), termed hyperemesis gravidarum (HG), is seen in 0.3-10.8% of pregnancies.<sup>2</sup> Diagnosis of HG is mostly based on clinical presentation, and persistence of NVP despite dietary modifications and antiemetic therapy is an

important indicator supporting the diagnosis of the condition. The American College of Obstetricians and Gynecologists Practice Guideline advises that HG should be diagnosed when patients experience persistent vomiting without another identifiable cause, along with ketonuria, weight loss exceeding 5%, electrolyte imbalances, and abnormalities in thyroid and liver function tests.<sup>3</sup>

The etiopathogenesis of HG is multifactorial, and rapid increases in pregnancy-related hormones, such as human chorionic gonadotropin, estrogen, progesterone, placental growth hormone, prolactin, thyroxine, and adrenocortical



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hormones are thought to be responsible for nausea and vomiting.<sup>4</sup> In addition, elevated levels of ghrelin, leptin, nesfatin-1, and peptide YY have also been implicated in its pathogenesis.<sup>5</sup> In the United States, HG is the leading cause of hospitalization during the first 20 weeks of pregnancy and approximately 0.5% to 2.1% of affected patients require inpatient treatment.<sup>4</sup> HG is one of the most debilitating conditions affecting quality of life (QoL) during pregnancy and assessing the severity of the condition is a key factor in improving treatment effectiveness.

There are several questionnaires available for evaluating the severity of HG. For the assessment of nausea and vomiting, the rhodes index was initially developed for general clinical use and was later adapted for pregnancy in 2001.<sup>6,7</sup> However, its eight-item format may be difficult to complete in clinical settings, especially for patients experiencing severe symptoms. The absence of a validated tool specifically designed to assess the severity of HG contributed to the development of the Pregnancy Unique Quantification of Emesis and Nausea (PUQE) score as a standardized and clinically practical measure.

The PUQE score was first described in 2002 to assess the severity of HG. It is a three-item tool and evaluated symptoms over the last 12-hours.<sup>8</sup> Due to its ease of use in clinical practice and its utility in guiding treatment decisions, the PUQE score is considered a valuable tool. However, since the severity of nausea and vomiting symptoms can vary throughout the day and night, a 24-hour version of the PUQE score was developed in 2009 to improve accuracy.<sup>9</sup> There is also a modified PUQE score which evaluates the symptoms for the entire first trimester.<sup>10</sup> This questionnaire consists of three items designed to assess the severity of symptoms. The Royal College of Obstetricians and Gynaecologists guideline recommend that clinical management and treatment decisions should be guided by the PUQE score-based classification system.<sup>11</sup>

Accurate and reliable tools, validated in Turkish, will be necessary for assessing the severity of HG in any Turkish population of pregnant women. This will provide accurate clinical evaluation and lead to better treatment decisions. Therefore, the aim of the present study was to perform the Turkish validation of the PUQE scoring system.

## METHODS

A cross-sectional study was conducted prospectively between December 1, 2023 and May 15, 2025 in a single private clinic. All women attending in the first trimester were eligible for inclusion. The study was conducted in accordance with Declaration of Helsinki and approved by the University of Health Sciences Turkey, Başakşehir Çam and Sakura City Hospital Ethics Committee with (approval number: KAEK/11.10.2023.481, date: 23.10.2023). All women gave informed consent orally before participation.

We adapted the modified PUQE questionnaire, which evaluated three specific symptoms of NVP for the last 24 hours.<sup>9</sup> The questionnaire was applied to the patients by nurses in the outpatient clinic. The Turkish version of PUQE score was paper-based, and the average time to complete

was only two minutes. PUQE score uses a five-point Likert scale that measures the duration of nausea, frequency of vomiting, and the frequency of retching or dry heaves in the last 24 hours. Scores were calculated by assigning a value to each response from “causing no discomfort” (score of 1) to “causing the most possible discomfort” (score of 5). The total score was calculated by summing the responses to each of the three items, which ranged from no symptoms (score of 3) to maximal symptoms (score of 15). This total was used to define mild NVP (score of 3-6), moderate NVP (score of 7-12), and severe NVP (score of  $\geq 13$ ).

The recommendations of the translation and cultural adaptation group and the consensus based standards for the selection of health measurements checklist were followed for the cross-cultural adaptation and validation of the Turkish version of the PUQE questionnaire.<sup>12,13</sup> The questionnaire was translated into Turkish by consensus of two experts with medical background (Appendix 1).

Pregnant women's demographic data was collected including the current pregnancy, obstetric and medical history, lifestyle and treatments for NVP. All data was secured in SPSS database. SPSS version 22.0 (IBM Corporation, Armonk, NY, USA) was used to conduct the statistical analysis. The test for normal distribution was conducted using the Kolmogorov-Smirnov test. For continuous variables having a normal distribution, descriptive statistics are displayed as mean  $\pm$  standard deviation (SD). Fisher's exact test or the chi-squared test was used to compare categorical variables. The independent samples t-test was used to compare continuous variables that were regularly distributed. For all tests, a *p* -value of less than 0.05 was considered statistically significant.

## Statistical Analysis

Content validity, which reflects whether the questionnaire is meaningful and appropriate for patients, was assessed by an expert committee of two obstetricians and gynecologists. Each item was rated on a 4-point scale (1 = not acceptable, 2 = poorly acceptable, 3 = acceptable, 4 = strongly acceptable). The content validity ratio (CVR) was calculated using Lawshe's method but, because CVR values are not considered reliable with fewer than five experts, the results were interpreted with caution. The content validity index (CVI) was calculated at both the item level (I-CVI) and the scale level (S-CVI/Ave), based on the proportion of items rated 3 or 4. Full agreement (I-CVI = 1.0) was required with two experts for an item to be considered valid. Internal consistency assessed using Cronbach's alpha analysis, with values between 0.70 and 0.99 indicating good internal consistency. Criterion validity was assessed by Pearson's correlation test, comparing nausea and vomiting severity scores with clinical parameters including the need for antiemetic medication and intravenous fluid transfusion.

## RESULTS

Of the 912 cases admitted during their first trimester of pregnancy, 11 were excluded because of ectopic pregnancy, 14 cases did not report or fill the PUQE questionnaire, 73 patients were diagnosed to have empty gestational sac, or no

embryonic or fetal heart beat by the end of 14 weeks, and 27 cases could not speak or read Turkish. This resulted in a total of 787 pregnant women in the first trimester being enrolled in the study.

Among the 787 pregnant women enrolled in the study, 321 (40.7%) reported having mild ( $n=186$ , 23.6%), moderate ( $n=122$ , 15.5%) or severe ( $n=13$ , 1.7%) NVP, while 466 women (59.2%) had none of the symptoms. Primigravid women constituted 39.7% ( $n=313$ ) of the study group. Regular antiemetic use was mandatory in 66 (8.4%) women while 26 (3.3%) women needed regular intravenous fluid infusions. The demographic data according to presence and absence of NVP is presented in Table 1. Age, working status, nulliparity, multiple

pregnancy rate, tobacco use during pregnancy, diabetes and hypertension rates were statistically similar between the NVP and non-NVP groups ( $p>0.05$ ). Mean pre-pregnancy body mass index (BMI) was  $27.8\pm6.3$  in the non-NVP group and  $29.2\pm5.8$  in NVP group ( $p=0.001$ ). In terms of education, the non-NVP group contained a significantly larger proportion of illiterate women ( $p=0.005$ ).

The demographic data according to the severity of PUQE score is presented in Table 2. Age, pre-pregnancy BMI, education status, working status, nulliparity, multiple pregnancy rate, tobacco use during pregnancy, diabetes and hypertension rates were statistically similar between mild, moderate and severe NVP groups ( $p>0.05$ ).

**Table 1. The demographic data according to presence and absence of nausea and vomiting of pregnancy**

| Variable  | Patients without NVP<br>( $n=466$ ) | Patients with NVP<br>( $n=321$ ) | $p$ value |
|---|-------------------------------------|----------------------------------|-----------|
| Age (years)   | $27.8\pm6.3$                        | $29.2\pm5.8$                     | 0.2       |
| Pre-pregnancy body mass index ( $\text{kg}/\text{m}^2$ )  | $27.8\pm6.3$                        | $29.2\pm5.8$                     | 0.001*    |
| Education   |                                     |                                  |           |
| Illiterate  | 73 (18.3)                           | 23 (8.8)                         | 0.005**   |
| Primary school  | 45 (11.3)                           | 26 (10)                          |           |
| Secondary school  | 74 (18.5)                           | 60 (23)                          |           |
| High school   | 157 (39.3)                          | 128 (49)                         |           |
| University  | 50 (12.5)                           | 24 (9.2)                         |           |
| Working   | 96 (20.6)                           | 79 (24.6)                        | 0.1       |
| Nulliparity   | 197 (42.3)                          | 116 (36.1)                       | 0.08      |
| Twin  | 23 (4.9)                            | 19 (5.9)                         | 0.5       |
| Tobacco use during pregnancy  | 39 (8.4)                            | 39 (12.1)                        | 0.08      |
| Diabetes  | 13 (2.7)                            | 12 (3.7)                         | 0.5       |
| Hypertension  | 7 (1.5)                             | 9 (2.8)                          | 0.2       |
| *Statistically significant ( $p<0.05$ ), Students t-test, ** Statistically significant ( $p<0.05$ ), chi-square test<br>NVP: Nausea and vomiting of pregnancy |                                     |                                  |           |

**Table 2. The demographic data according to the severity of PUQE score among women with nausea and vomiting of pregnancy**

| Variable   | Mild ( $n=186$ ) | Moderate ( $n=122$ ) | Severe ( $n=13$ ) | $p$ value |
|--|------------------|----------------------|-------------------|-----------|
| Age (years)  | $29.7\pm5.9$     | $28.7\pm5.8$         | $28.1\pm3.6$      | 0.2       |
| Pre-pregnancy body mass index ( $\text{kg}/\text{m}^2$ )   | $28.8\pm4.4$     | $29.4\pm4.5$         | $31.1\pm4.2$      | 0.1       |
| Education  |                  |                      |                   |           |
| Illiterate   | 15 (10.5)        | 7 (6.6)              | 1 (8.3)           | 0.4       |
| Primary school   | 15 (10.5)        | 10 (8.1)             | 1 (8.3)           |           |
| Secondary school   | 28 (19.6)        | 31 (29.2)            | 1 (8.3)           |           |
| High school  | 72 (50.3)        | 47 (44.3)            | 9 (75)            |           |
| University   | 13 (9.1)         | 11 (10.4)            | 0                 |           |
| Working  | 13 (9.1)         | 4 (3.7)              | 0                 | 0.7       |
| Nulliparity  | 65 (34.9)        | 44 (36.1)            | 7 (53.8)          | 0.3       |
| Twin   | 10 (5.4)         | 8 (6.6)              | 1 (7.7)           | 0.8       |
| Tobacco use during pregnancy                               | 22 (11.8)        | 16 (13.1)            | 1 (7.7)           | 0.8       |
| Diabetes   | 3 (1.6)          | 9 (7.3)              | 0                 | 0.1       |
| Hypertension   | 6 (3.2)          | 3 (2.4)              | 0                 | 0.7       |
| PUQE: Pregnancy Unique Quantification of Emesis and Nausea |                  |                      |                   |           |

Item pool, retention and decisions based on reliability analysis is presented in Table 3. The item means ranged from 0.8 to 1, indicating a moderate distribution of responses across items. SDs were within an acceptable range, suggesting variability in participant responses. The corrected item-total correlation coefficients ranged between 0.81 and 0.91, well above the acceptable threshold of 0.30. These values indicate that each item demonstrates strong discrimination and contributes significantly to the overall construct of nausea and vomiting severity. The overall PUQE score in the 787 pregnant women had a Cronbach's alpha coefficient of 0.963 and a mean score of  $4.6 \pm 2.68$  (3-15) demonstrating good internal reliability. Based on these results, all items were retained in the final version of the Turkish PUQE scale.

Correlation analysis of PUQE score items with each other and with antiemetic use or intravenous fluid infusion is

given in Table 4. The number of participants included in the correlation analysis was 787. All three PUQE items showed significant positive correlations with one another ( $r=0.656-0.800$ ,  $p<0.001$ ), indicating internal coherence among the items measuring nausea, vomiting, and retching. In addition, each item was positively correlated with the use of antiemetic medications and intravenous fluid therapy. The strongest correlations were observed between vomiting and antiemetic use ( $r=0.701$ ,  $p<0.001$ ), supporting the clinical relevance of the scale. These findings suggest that higher scores on the PUQE items are associated with increased clinical intervention, consistent with a higher severity of symptoms.

## DISCUSSION

In this study, we aimed to translate into Turkish and then evaluate the validity and reliability of the Turkish version of

**Table 3. Item pool, retention and decisions based on reliability analysis**

| PUQE item no | Item mean | Item standard deviation | Corrected item total correlation | Cronbach's alpha |
|--------------|-----------|-------------------------|----------------------------------|------------------|
| 1            | 1         | 1.5                     | 0.91                             | 0.89             |
| 2            | 0.8       | 1.2                     | 0.81                             | 0.76             |
| 3            | 0.9       | 1.4                     | 0.87                             | 0.84             |

PUQE: Pregnancy Unique Quantification of Emesis and Nausea

**Table 4. Correlation analysis of PUQE score items with each other and with antiemetic use or intravenous fluid infusion**

| Correlations               |                     |         |         |         |            |          |
|----------------------------|---------------------|---------|---------|---------|------------|----------|
| For all correlations n=787 |                     | Item 1  | Item 2  | Item 3  | Antiemetic | 4 fluids |
| Item 1                     | Pearson correlation | 1       | 0.721** | 0.800** | 0.568**    | 0.404**  |
|                            | Sig. (2-tailed)     |         | <0.001  | <0.001  | <0.001     | <0.001   |
|                            | n                   | 787     | 787     | 787     | 787        | 787      |
| Item 2                     | Pearson correlation | 0.721** | 1       | 0.656** | 0.701**    | 0.529**  |
|                            | Sig. (2-tailed)     | <0.001  |         | <0.001  | <0.001     | <0.001   |
|                            | n                   | 787     | 787     | 787     | 787        | 787      |
| Item 3                     | Pearson correlation | 0.800** | 0.656** | 1       | 0.474**    | 0.345**  |
|                            | Sig. (2-tailed)     | <0.001  | <0.001  |         | <0.001     | <0.001   |
|                            | n                   | 787     | 787     | 787     | 787        | 787      |
| Antiemetic                 | Pearson correlation | 0.568** | 0.701** | 0.474** | 1          | 0.611**  |
|                            | Sig. (2-tailed)     | <0.001  | <0.001  | <0.001  |            | <0.001   |
|                            | n                   | 787     | 787     | 787     | 787        | 787      |
| 4 fluids                   | Pearson correlation | 0.404** | 0.529** | 0.345** | 0.611**    | 1        |
|                            | Sig. (2-tailed)     | <0.001  | <0.001  | <0.001  | <0.001     |          |
|                            | n                   | 787     | 787     | 787     | 787        | 787      |

\*\*Correlation is significant at the 0.01 level (2-tailed)  
PUQE: Pregnancy Unique Quantification of Emesis and Nausea



the 24-hour PUQE scale in a large cohort of pregnant women. The Turkish PUQE score demonstrated excellent internal consistency, with a Cronbach's alpha of 0.963, indicating that the items reliably measure the underlying construct of NVP. Corrected item-total correlations ranged from 0.81 to 0.91 as seen in Table 3, further supporting the contribution of each item to the overall score. Moreover, the three core items of the PUQE scale showed strong and significant inter-item correlation, suggesting high internal coherence. The observed associations between higher PUQE item scores and increased use of antiemetic medication and/or intravenous fluid therapy provide additional evidence for the clinical validity of the scale (Table 4). These results collectively support the Turkish PUQE as a psychometrically sound instrument for quantifying the severity of NVP in pregnant women.

There are some studies assessing a PUQE score with language translation, however, only a few studies cross-culturally adapted and validated the PUQE score. For instance, the Norwegian PUQE-24 (Svangerskaps Utløst Kvalme Kvantifisering-SUKK) was prospectively validated among women with HG and healthy pregnant controls.<sup>14</sup> PUQE scores distinguished severe cases (median 13 vs. 7) and correlated inversely with nutritional intake ( $r=-0.5$ ,  $p<0.001$ ). This study involved 31 healthy pregnant women and 38 HG patients who were hospitalized. PUQE scores were obtained before and after treatment. Thus the Norwegian study differs from ours as it evaluated before and after treatment PUQE scores in a cohort of hospitalized HG patients. To date, the Turkish study of the PUQE-24 has been one of the few linguistically and psychometrically validated adaptations of the PUQE score.<sup>15</sup> In this study the scale underwent a rigorous translation, cross-cultural adaptation, and validation process. The authors reported acceptable internal consistency (Cronbach's alpha =0.75) and strong item-total correlations ( $r=0.75-0.85$ ). However, it is important to note that this study involved 90 patients and any of them reported severe NVP which PUQE score was 13-15. In addition, the study patients self-reported NVP. However, antiemetic use or intravenous treatment and correlation with PUQE score was not assessed, unlike in the present study. There is a French validation study of the PUQE score which included 399 patients and 238 of them reported NVP.<sup>16</sup> This study suggested that total PUQE score and self-reported NVP symptoms and NVP-QoL score were positively correlated. However, correlation analysis of PUQE score items with each other was not applied, again differing from the present study. A study conducted in Finland investigated the usability PUQE score in hospitalized HG patients compared to the visual analog score and NVP-QoL.<sup>17</sup> Although this was not a validation and cultural adaptation study, it is valuable that they showed the positive correlation between PUQE score and severity of NVP.

PUQE score is a handy tool to assess the severity of HG since it is quick to complete and self-reported. Although it is mostly used to assess the severity of NVP in outpatient clinic, there are some studies that have shown that PUQE score before and after hospitalization demonstrated a reliable change with changes in symptoms.<sup>14,17-19</sup> The original studies both assessing the symptoms for 12 hours, 24 hours and the entire

first trimester with PUQE questionnaire showed a significant correlation between the PUQE score and symptom severity.<sup>8-10</sup>

The strengths of our study include the large cohort, including both NVP and non-NVP patients which provides an advantage in terms of testing the discriminatory power of the questionnaire. Comparing the mild, moderate and severe NVP patients also increases the power of the study.

### Study Limitations

Limitations of the study include the single-center design. In addition, NVP severity was self-reported rather than assessed using another validated tool. PUQE score was not correlated with another validated NVP assessment tool. Lastly, patients were not reassessed with the Turkish PUQE scale after treatment.

## CONCLUSION

Since PUQE score is a three-item tool with ease of use, validation and adaptation to Turkish is important to evaluate the severity of NVP in Turkish populations. It will also aid in treatment decision and assessing response to treatment in any Turkish population. This tool can now be used in both clinical and research settings in Turkey but there should be multi-center studies with large patient groups to compare the PUQE score with other NVP questionnaires to confirm its validity and reliability in the Turkish language.

### Ethics

**Ethics Committee Approval:** The study was conducted in accordance with Declaration of Helsinki and approved by the University of Health Sciences Turkey, Başakşehir Çam and Sakura City Hospital Ethics Committee with (approval number: KAEK/11.10.2023.481, date: 23.10.2023).

**Informed Consent:** All women gave informed consent orally before participation.

### Footnotes

### Authorship Contributions

Surgical and Medical Practices: E.H.C., E.A., Concept: E.H.C., Design: R.A.B., E.A., B.Y., Data Collection or Processing: E.H.C., E.A., Analysis or Interpretation: B.Y., Literature Search: R.A.B., B.Y., Writing: R.A.B.

**Conflict of Interest:** No conflict of interest was declared by the authors.

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#### Appendix 1: Translation of the PUQE score in Turkish

##### PUQE (gebeliğe özgü bulantı ve kusma puanlaması) Lütfen size en uygun cevabı işaretleyiniz.

1. Son 24 saat içinde ne kadar süre bulantı veya mide rahatsızlığı hissettiniz?

|         |                         |              |              |                          |
|---------|-------------------------|--------------|--------------|--------------------------|
| Hiç (1) | 1 saat veya daha az (2) | 2-3 saat (3) | 4-6 saat (4) | 6 saatten daha fazla (5) |
|---------|-------------------------|--------------|--------------|--------------------------|

2. Son 24 saat içinde kustunuz mu, kusmuk çıkardınız mı?

|                  |                    |                    |                    |                            |
|------------------|--------------------|--------------------|--------------------|----------------------------|
| Hiç kusmadım (1) | 1-2 kez kustum (2) | 3-4 kez kustum (3) | 5-6 kez kustum (4) | 7 ve daha fazla kustum (5) |
|------------------|--------------------|--------------------|--------------------|----------------------------|

3. Son 24 saat içinde kaç kez midenizden bir şey çıkmadan öğürdünüz veya geçirdiniz?

|                  |             |             |             |                         |
|------------------|-------------|-------------|-------------|-------------------------|
| Hiçbir zaman (1) | 1-2 kez (2) | 3-4 kez (3) | 5-6 kez (4) | 7 kez ve daha fazla (5) |
|------------------|-------------|-------------|-------------|-------------------------|

Parantez içindeki sayıları toplayarak PUQE-24 skorunu hesaplayınız:  
Hafif 4-6 Orta: 7-12 Ağır:  $\geq 13$

PUQE: Pregnancy Unique Quantification of Emesis and Nausea