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# Reliability and Validity of the Turkish Version of the Gastrointestinal Symptom Rating Scale

## ABSTRACT

The purpose of this methodological study is to investigate the validity and reliability of the Turkish version of the Gastrointestinal Symptom Rating Scale (GSRS). The scale was adapted to the Turkish language via backward translation. Content validity was examined by referring to experts. Reliability was examined via test-retest reliability and internal consistency, and validity was examined with divergent and convergent validity. The Epworth Sleepiness Scale (ESS) and the Marlowe-Crowne Social Desirability Scale (MCSDS) were used for divergent validity. As for convergent validity, the Constipation Severity Instrument (CSI) and the Patient Assessment of Constipation Quality of Life Scale (PAC-QOLQ) were utilized. The relationship between the GSRS and the health-related quality of life (36-item short-form health survey [SF-36]) was also analyzed. The study population consisted of patients in orthopedic clinic who volunteered to participate. Test-retest reliability was examined with the participation of 30 patients; internal consistency and validity were examined with 150 patients. Test-retest reliability correlation coefficients of the GSRS varied from 0.39 to 0.87 for all items. For internal consistency, the GSRS's item total correlation was found to be 0.17–0.67, and Cronbach  $\alpha$  was 0.82 for all items. There was a positive linear significant correlation between the GSRS, CSI, and PAC-QOLQ. There was no significant correlation between the GSRS, MCSDS, and ESS. Higher GSRS scores inversely correlated with general quality of life (SF-36). The Turkish version of the GSRS has been found to be a reliable and valid instrument for assessing patients' gastrointestinal symptoms. Therefore, this instrument can be confidently used with Turkish individuals.

**G**astrointestinal (GI) symptoms, highly common around the world, include discomfort related to esophagus, stomach, duodenum, jejunum, ileum, large bowels, sigmoid colon, and rectum (Knutsson & Boggil, 2010). Despite not being a life-threatening disease, GI symptoms have

a negative impact on daily routines and quality of life (Revicki, Wood, Wiklund, & Crawley, 1998; Saberi & Moravveji, 2010). It is reported that the prevalence of GI symptoms is between 35% and 70% (Lee, Mun, Lee, & Cho, 2011; Suarez, Mayer, Ehlert, & Nater, 2010).

Gastrointestinal symptoms are among the most frequent diseases, yet its etiology is not known well (Kaya & Turan, 2011). Theoretically, it is assumed that various mechanisms are at play in their emergence. Major mechanisms include imbalances between aggressive and defensive factors in relation to stomach functions that weaken abdomen mucous barriers, imbalances in inflammatory cells, and stress and inability of bowels because of anti-inflammatory cells (Cruso, Lusk, & Gillespie, 2004; Knutsson & Boggil, 2010). Stressors in particular lead to the emergence of GI symptoms around the autonomous nervous system and at the axis of hypothalamus–hypophysis–suprarenal gland as well as changes in bowel functions by the immune system (Hertig et al., 2007; Knutsson & Boggil, 2010).

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Studies aimed at determining the effects of psychological factors on GI symptoms show that these factors develop in the case of ongoing chronic stress (daily problems, work-related stress, etc.) or due to life occurrences (disease, accident, loss of job, etc.) (Bhatia & Tandon, 2005; Hertig et al., 2007; Suarez et al., 2010).

Among the most common reasons for GI symptoms are age, infections, mental and psychological disorders, lack of appetite, unhealthy diet, irregular meal times, work-related stress, smoking/alcohol intake, low levels of income, travelling across different time zones, working in shifts, taking medicine (opioid type of medicine) and side effects of medicine (anti-inflammatory, non-steroids, etc.), and irregular defecation (Knutsson & Boggil, 2010; Saberi & Moravveji, 2010). In a study conducted by Norton et al. (1999) with 127 university students in Canada, 62.8% of the students were diagnosed with GI diseases: dyspepsia (22.8%), constipation (20.5%), and gastritis (19.5%). In another study by Suarez et al. (2010), 64.2% of the students complained about GI symptoms. Abdominal distention (39.5%) and functional esophagus discomfort (14.5%) were among the most frequently reported discomfort (Suarez et al., 2010).

Patients complain about GI symptoms most in the clinical environment, and they are also considered among the major disorders that reduce efficiency and require healthcare service (Frank et al., 2000). Although patients often complain about GI symptoms, there are inadequacies in classification of these symptoms and healthcare services provided for them (Lee et al., 2011). Scales that are developed along this line can help collect much more data more economically in a shorter period (Saberi & Moravveji, 2010). Gastrointestinal symptoms are the primary disorders related to the GI system that healthcare personnel should monitor.

International literature is abundant in studies conducted to assess the existence of GI symptoms, their frequency, and intensity (Damiano, Siddique, Xu, Johanson, & Sloan, 2003). However, it was not possible to find any relevant study findings and measurement tools in Turkey. This study is the result of the lack of instruments with validity and reliability that have been confirmed and which measure perceived patient symptoms. It should be noted, however, that it is challenging to develop a new instrument to measure any problem. For this reason, there is a tendency to use scales, through cultural adaptation, whose validity and reliability are already established (Erefe, 2002; Kaya & Aşti, 2008; Kaya & Turan, 2011). In short, the aim of the present study is to adapt an English scale, which was designed to determine GI symptoms, into Turkish.

## Material and Methods

### Aim and Type of the Study

The present methodologic study was conducted to establish the reliability and validity for the Turkish equivalence of the Gastrointestinal Symptom Rating Scale (GSRS).

### Study Sample

The study population consisted of patients who were enrolled in a university orthopedic clinic in Istanbul between January 2010 and June 2011 and were provided inpatient treatment and healthcare. Test-retest reliability of the scale was tested with 30 patients. In order to determine internal consistency, divergent validity, and convergent validity, the number of items which were tested while determining the scope of the sample group was taken into consideration (15 items in total). 150 patients were included in the study sample through random sampling (10 times more than the number of items).

### Ethical Permissions

Astrazeneca was contacted in written communication for the use of the scale and required permission was obtained for its Turkish adaptation. Written permission was acquired from the head of the department of orthopedics clinic where study data were collected. Patients in the sample group were informed about the aim and value of the study as well as their roles in this process and their oral consent was assured.

### Data Collection Tools

#### *Individual Information Form*

An information form was utilized for collecting personal information related to patients' gender and age.

#### *Gastrointestinal Symptom Rating Scale*

The Gastrointestinal Symptom Rating Scale (GSRS) was developed by Revicki, Wood, Wiklund, and Crawley (1998) in order to determine common symptoms of GI diseases, clinical experiences, and opinions regarding GI symptoms. The GSRS is a seven-point Likert scale with 15 questions, and has response options ranging from "no problem" to "severe discomfort." On the basis of factor analysis, the GSRS has five subdimensions: diarrhea, indigestion, constipation, abdominal pain, and reflux. In the GSRS, the patient is questioned about how she or he feels regarding GI problems during the last week. The greater the scores are, the more intense the symptoms are (Revicki et al., 1998).

#### *Constipation Severity Instrument*

The Constipation Severity Instrument (CSI) developed by Varma et al. (2008) is an instrument used to

determine defecation frequency and intensity, and problems/difficulty during defecation. It can also be used to measure constipation symptoms. A reliability and validity study of its Turkish adaptation was conducted by Kaya and Turan (2011). With 16 questions, the instrument consists of three subdimensions: obstructive defecation, colonic inertia, and pain. The minimum and maximum scores for obstructive defecation range from 0 and 28, from 0 to 29 for colonic inertia, and lastly from 0 to 16 for pain. The lowest score obtainable from the CSI is 0, whereas the highest score is 73. A greater score imply the severity of the symptoms (Kaya & Turan, 2011; Varma et al., 2008). To able to determine convergent validity of the GSRS, the CSI was utilized in the present study.

### *Patient Assessment of Constipation Quality of Life Scale*

The Patient Assessment of Constipation Quality of Life Scale (PAC-QOLQ) developed by Marquis, De La Loge, Dubois, McDermott, and Chassany (2005) is a self-administered five-point Likert scale with 28 items and consists of four subdimensions: “anxiety (11 items)”, “physical discomfort (four items)”, “psychosocial discomfort (eight items)” and “satisfaction (five items).” The lowest and highest scores are as follows, respectively: 28 and 140. It is assumed that the higher the scores are, the more negatively quality of life is affected (Dedeli, Turan, Fadiloğlu, & Bor, 2007; Marquis et al., 2005). In their study, Dedeli et al. (2007) stated that the Turkish version of the PAC-QOLQ can be used as a reliable and valid scale. The present study made use of the PAC-QOLQ to determine convergent validity of the GSRS (Dedeli et al., 2007; Marquis et al., 2005).

### *Epworth Sleepiness Scale*

Developed with the aim of measuring daytime sleepiness, the Epworth Sleepiness Scale (ESS) is a self-administered eight-item questionnaire that was proposed as a simple method for measuring sleepiness in adults in 1991 by Johns. In the ESS, tendency to sleep during eight daily activities is questioned (Johns, 1991, 1992; Kaya & Turan, 2011). In this study, the ESS was used to determine divergent validity of the GSRS.

### *Marlowe-Crowne Social Desirability Scale*

Developed by Marlowe and Crowne (1960, 1964), the Marlowe-Crowne Social Desirability Scale (MCSDS) is a frequently used 10-item scale. It assesses social desirability or desire demeanors. In validity and reliability studies, the MCSDS is often utilized to determine divergent validity. Therefore, this scale was used to determine divergent validity of the GSRS (Crowne & Marlowe, 1960; Ural & Özbirecikli, 2006). Using factor and reliability analyses, a seven-item Turkish

short-form of the MCSDS was produced. The MCSDS consists of three constructs: (1) management of social relations, (2) violations of social norms, and (3) control of behaviors, ambition, and personal achievement.

### *MOS 36-Item Short-Form Health Survey*

The MOS 36-item Short-Form Health Survey (SF-36) was designed by Ware (1987) to survey health-related quality of life status. The SF-36 is a 36-item scale that assesses eight health concepts as well as general physical health and general mental health: (1) physical functions; (2) limitations in role activities because of physical health problems; (3) bodily pain; (4) general health perceptions; (5) vitality; (6) social functions; (7) limitations in role activities because of mental health problems; and (8) mental health. Higher scores refer to the increasing quality of life (Ware & Sherbourne, 1992). In this present study, the SF-36 was used in order to determine the relationship between the GSRS and general health-related quality of life.

## **Procedure**

### *GSRS Language Equivalence and Content Validity*

In order to construct GSRS language equivalence, three experts with an excellent command of English were asked to independently translate the scale into Turkish. The Turkish version of scales was scrutinized by a faculty member, an expert in the field, and another expert in Turkish language and literature. Contradictory statements were analyzed and scales were brought together into one form.

The Turkish GSRS was transferred to two individuals who both have a good command of English and its culture as well as the Turkish language and its culture, and they were asked to translate it into English. The GSRS back-translated into English was compared with the original one, and its logic and consistency of statements were established.

A content validity of the Turkish version of the GSRS was tested by using a “content validity index.” In this respect, the GSRS was given to 13 experts who were asked to determine the intelligibility of questions and their suitability to Turkish culture by using a four-point Likert scale. Subsequently, the experts were asked to write their suggestions in relevant parts. In this scale, one denotes “not suitable”, two means “somewhat suitable (item revision is required), three means “quite suitable (subtle changes are needed, though),” and four means “highly suitable.” Experts agreed on suitability of all items at 95%–100%.

This stage was followed by one-to-one interviews with 15 orthopedic patients in which the GSRS was implemented and its intelligibility established. The

results showed that the Turkish version of the GSRS could be confidently used in statistical validity and reliability studies.

## Reliability and Validity of the GSRS

GSRS reliability was examined through test-retest and internal consistency methods, whereas validity was examined by using methods of discriminant and convergent validity methods.

## Data Analysis

Data gathered from the study were entered into the Statistical Package for Social Science for Windows (SPSS 11.0) database and was analyzed statistically via this program. Ordinal data were analyzed as arithmetic average, standard deviation, and minimum and maximum values, whereas for nominal data, frequency and percentage were used. To determine correlation between ordinal data, Pearson's product-moment

coefficient was used whereas total item score correlation and Cronbach  $\alpha$  coefficient were utilized for the examination of GSRS internal consistency (Akgül & Çevik, 2005; Özdamar, 2003; Özdemir, 2005).

## Results

Up to 54% ( $n = 81$ ) of the study population ( $N = 150$ ) consisted of women, and mean age was 49.15 years ( $SD = 19.86$ ,  $Min = 19$ ,  $Max = 88$ ).

## Reliability of the GSRS

### Time Invariance

To examine its reliability, test-retest was administered to 30 patients with a 2-week interval. It was found that the GSRS test-retest correlation coefficient ranged from 0.39 to 0.87 in scale items. It was 0.47 for diarrhea subdimension, 0.66 for indigestion, 0.71 for constipation, 0.77 for abdominal pain, and 0.74 for reflux subdimension (Table 1).

**TABLE 1. Gastrointestinal Symptom Rating Scale Test-Retest Reliability Coefficients (N = 30)**

Scale Items	Test-Retest Correlation <sup>a</sup>	
	r	p
Diarrhea syndrome	0.47	.009
11. Have you suffered from diarrhea in the last week?	0.42	.020
12. Has there been any softening in your stool in the last week?	0.63	.000
14. Have you had the any sudden urges for stool in the last week?	0.59	.001
Indigestion syndrome	0.66	.000
6. Have you felt any gurgling in your stomach in the last week?	0.42	.021
7. Have you had any stomach bloating in the last week?	0.77	.000
8. Have you had any problems with eructation in the last week?	0.43	.019
9. Have you had any need for farting in the last week?	0.50	.005
Constipation syndrome	0.71	.000
10. Have you suffered from constipation in the last week?	0.64	.000
13. Has there been any hardening in your stool in the last week?	0.56	.001
15. Have you had any feeling of incomplete evacuation in toileting in the last week?	0.59	.001
Abdominal pain syndrome	0.77	.000
1. Have you had any pain in the upper part of your abdomen or pit of your stomach in the last week?	0.87	.000
4. Have you had any pain due to hunger in the last week?	0.39	.034
5. Have you suffered from nausea in the last week?	0.53	.003
Reflux syndrome	0.74	.000
2. Have you felt any burning in your abdomen in the last week?	0.70	.000
3. Have you had any discomfort related to reflux in the last week?	0.71	.000
Total	0.83	.000

<sup>a</sup>Pearson's product-moment coefficient.



### Internal Consistency

GSRS internal consistency was calculated both for all items in the scale and items of subdimensions using item-total score correlation and Cronbach  $\alpha$ . Correlation between total GSRS scores and scores obtained from each item is shown in Table 2, and was determined to be 0.17–0.67. Results also indicate that item scores are positively correlated with the total score. Cronbach  $\alpha$  was found to be 0.82 for the scale (Table 2).

### Validity of the GSRS

Validity of the GSRS was tested through convergent validity by using the CSI and the PAC-QOLQ (Table 3). A moderate correlation was observed between the GSRS and the PAC-QOLQ. Findings showed that as GI system symptoms get worse, constipation-related quality of life becomes negatively correlated. A similar correlation was identified between the GSRS and the CSI. In order to determine divergent validity of the GSRS, the correlation between the GSRS and ESS and the GSRS and MCSDS was examined, and as expected, no statistically significant correlation was found (Table 4).

### Correlation Between the GSRS and the General Quality of Life

The GSRS total score and scores obtained from subdimensions were negatively correlated at a significant level with SF-36 scores of General Physical and Mental Health (Table 5). This result was interpreted as follows: the more severe GI system symptoms are, the lower general quality of life is.

### Discussion

The present study was conducted to adapt the original English GSRS into Turkish, and test its reliability and validity. The scale consisting of 15 items was found to be easily intelligible and applicable by all participant patients.

### Reliability of the GSRS

#### Time Invariance

Time invariance questions whether the instrument provides similar results at repetitive measures at different times (Atar & Aştı, 2012; Erefe, 2002; Kaya & Aştı, 2008). Findings show that GSRS test-retest correlation

**TABLE 2. Gastrointestinal Symptom Rating Scale Item-Total Score Correlation and Cronbach  $\alpha$  Coefficient**

Scale Items	$r^a$	$\alpha^b$
1. Have you had any pain in the upper part of your abdomen or pit of your stomach in the last week?	0.50	0.81
2. Have you felt any burning in your abdomen in the last week?	0.55	0.81
3. Have you had any discomfort related to reflux in the last week?	0.41	0.82
4. Have you had any pain due to hunger in the last week?	0.37	0.82
5. Have you suffered from nausea in the last week?	0.46	0.81
6. Have you felt any gurgling in your stomach in the last week?	0.32	0.82
7. Have you had any stomach bloating in the last week?	0.67	0.80
8. Have you had any problems with eructation in the last week?	0.49	0.81
9. Have you had any need for farting in the last week?	0.38	0.82
10. Have you suffered from constipation in the last week?	0.61	0.80
11. Have you suffered from diarrhea in the last week?	0.17	0.83
12. Has there been any softening in your stool in the last week?	0.21	0.83
13. Has there been any hardening in your stool in the last week?	0.53	0.81
14. Have you had the any sudden urges for stool in the last week?	0.30	0.82
15. Have you had any feeling of incomplete evacuation in toileting in the last week?	0.53	0.81
Total		0.82

<sup>a</sup>Pearson's product-moment coefficient.

<sup>b</sup>Cronbach  $\alpha$  coefficient.

**TABLE 3. Gastrointestinal Symptom Rating Scale Convergent Validity Pearson Correlation Coefficient (N = 150)**

Gastrointestinal Symptom Rating Scale	Constipation Quality of Life					Constipation Severity Scale			
	Physical Discomfort	Psychosocial Discomfort	Anxiety	Satisfaction	PAC-QOLQ Total	Defecation Obstruction	Colonic Inertia	Pain	CSI Total
Diarrhea syndrome	0.223 <sup>a</sup>	0.132	0.104	-0.045	0.153	0.143	0.256 <sup>a</sup>	0.180 <sup>b</sup>	0.220 <sup>a</sup>
Indigestion syndrome	0.596 <sup>a</sup>	0.295 <sup>a</sup>	0.459 <sup>a</sup>	-0.144	0.489 <sup>a</sup>	0.428 <sup>a</sup>	0.309 <sup>a</sup>	0.318 <sup>a</sup>	0.432 <sup>a</sup>
Constipation syndrome	0.670 <sup>a</sup>	0.378 <sup>a</sup>	0.564 <sup>a</sup>	-0.201 <sup>b</sup>	0.582 <sup>a</sup>	0.686 <sup>a</sup>	0.558 <sup>a</sup>	0.449 <sup>a</sup>	0.703 <sup>a</sup>
Abdominal pain syndrome	0.437 <sup>a</sup>	0.419 <sup>a</sup>	0.361 <sup>a</sup>	-0.006	0.468 <sup>a</sup>	0.308 <sup>a</sup>	0.279 <sup>a</sup>	0.318 <sup>a</sup>	0.353 <sup>a</sup>
Reflux syndrome	0.371 <sup>a</sup>	0.162 <sup>b</sup>	0.202 <sup>b</sup>	-0.021	0.266 <sup>a</sup>	0.211 <sup>a</sup>	0.155	0.204 <sup>b</sup>	0.224 <sup>a</sup>
GSRS Total	0.702 <sup>a</sup>	0.421 <sup>a</sup>	0.535 <sup>a</sup>	-0.143	0.604 <sup>a</sup>	0.570 <sup>a</sup>	0.485 <sup>a</sup>	0.449 <sup>a</sup>	0.610 <sup>a</sup>

Note. CSI = Constipation Severity Instrument; GSRS = Gastrointestinal Symptom Rating Scale; PAC-QOLQ = Patient Assessment of Constipation Quality of Life Scale.  
<sup>a</sup>Correlation at 0.01.  
<sup>b</sup>Correlation at 0.05 (two-tailed).

coefficients ranged from 0.39 to 0.83. Revicki et al. (1998) proposed that correlations were 0.42–0.60 in their study. Kulich et al. (2008) conducted a study in six different countries (South Africa, Germany, Hungary, Italy, Portugal, and Spain), and the relevant coefficient was determined to be 0.36–0.75. Additionally, in its German adaptation, test-retest correlation coefficients were reported to range from 0.49 to 0.73, in the Hungarian version from 0.52 to 0.82, in Portuguese from 0.34 to 0.63, and in its Spanish counterpart correlations ranged from 0.44 to 0.63 (Kulich et al., 2003, 2004, 2005a, 2005b). In this study, correlation values above 0.25 were considered acceptable and the GSRS was analyzed accordingly.

Relevant literature indicates that values from 0.00 to 0.25 are highly weak, and those between 0.26 and 0.49 are weak. Values of 0.50–0.69 and 0.70–0.89 were found to be moderate and high, respectively. Values of 0.90–1.00 were reserved for the “rather high” category (Akgül, 2003; Kaya & Aşti, 2008). When the findings of the present study are analyzed in the light of current literature, it can be proposed that total item scores in the GSRS and total scores of the subdimensions indicate no temporal variation. In addition, the predictive analysis of the GSRS’s time invariance within the scope of its reliability and validity study of the Turkish adaptation is thought to make a considerable contribution to literature.

**Internal Consistency**

Internal consistency assumes that an instrument is composed of independent units and these units are evenly distributed in a known uniformity (Erefe, 2002; Gözüm & Aksayan, 2003). To be able to propose that an instrument has internal consistency, it is essential to prove that all subdimensions of the instrument measure the same property (Gözüm & Aksayan, 2003; İncirkuş & Nahcivan, 2011). Internal consistency is alternately called “homology” of the instrument.

Reliability determines whether each unit of a scale is well-equipped to measure relevant variables or not. Cronbach α and item-total score correlation are two of the methods used to test internal consistency reliability (Akgül, 2003; Erefe, 2002; Gözüm & Aksayan, 2003; Kaya & Turan, 2011).

The level of competence for item-total score correlation coefficients varies depending on citations. There are citations that recognize 0.20 as the lowest level, yet the mostly acknowledged value is 0.25. It is accepted as 0.30 in some studies for better assured reliability. Regardless, a greater correlation coefficient indicates more reliable items (Akgül & Çevik, 2005; Atar & Aşti, 2012).

When the correlation coefficient between the total GSRS score and scores of each item were considered, it

**TABLE 4. Gastrointestinal Symptom Rating Scale Divergent Validity Using the Pearson Correlation Coefficient (N = 150)**

Gastrointestinal Symptom Rating Scale	Epworth Sleepiness Scale	Marlowe-Crowne Social Desirability Scale
Diarrhea syndrome	−0.040	−0.008
Indigestion syndrome	0.065	0.142
Constipation syndrome	0.048	0.020
Abdominal pain syndrome	0.155	0.004
Reflux syndrome	0.028	0.137
GSRS Total	0.079	0.081

Note. GSRS = Gastrointestinal Symptom Rating Scale.

was reported to vary between 0.21 and 0.67 and item scores were positively correlated with the total score. Cronbach  $\alpha$  for the scale was found to be 0.82 in the total scale. Revicki et al. (1998) found it to be 0.61–0.83 for their study, whereas in the study by Kulich et al. (2008), it was observed as 0.43–0.87. Specifically, the following correlation coefficient was gathered in these adaptations of the GSRS, respectively (German, Hungarian, Portuguese, and Spanish): 0.53–0.91, 0.62–0.84, 0.58–0.88, and 0.59–0.83 (Kulich et al., 2003, 2004, 2005a, 2005b). To conclude, the Turkish adaptation of the GSRS has internal consistency at an adequate level.

### Validity

Validity is the second important property that helps determine to what extent a data collection tool encapsulates or reflects the constituents (such as theories, concepts, or variables) that it is supposed to measure. The question of validity is related to whether the researcher really measures the variable that he or she is thinking of measuring or not. Nevertheless, it is inevitable to yield misleading results even though an instrument has room for error of measurement, and thereby produce changing results; in other words, the instrument has a limited reliability. For this reason, validity and reliability are two essential components of an instrument that cannot be considered independent of each other (Kaya & Aşti, 2008).

There are a variety of methods constructed to determine validity. It follows according to the literature that it is possible to test construct validity of an instrument by evaluating what kind of a relationship it has with a different test or tests with the same or different constructs. In other words, it is of importance to determine variables that a test does not measure as well as those it measures (Gözüm & Aksayan 2003). In this context, the method that helps determine how a test diverges from unrelated scales is called “divergent validity,”

whereas the one that shows how a test converges with related scales is called “convergent validity.” When these characteristics of the GSRS are analyzed, it was concluded that by comparing with the CSI and the PAC-QOLQ, which are used as valid and reliable scales in Turkish, it was possible to test convergent validity of the GSRS.

In the practice of convergent validity of an instrument, it is aimed to yield the comparison of two measurements of the same concept at the same time point. If a high correlation is established between the measurement of the instrument in question and the other measure, it is considered as support that the instrument yields a valid measurement (Kaya & Aşti, 2008). In this study, the GSRS and the PAC-QOLQ were applied at the same time and the Pearson correlation coefficient was found to be 0.60. On the other hand, the correlation coefficient between the total GSRS and CSI scores was observed as 0.61. When all these findings are taken into consideration in the light of literature, the GSRS instrument was in the predicted boundaries necessary for the support of its validity (Akgül, 2003).

In order to examine divergent validity of the GSRS, the ESS and the MCSDS were used with patients. Sleepiness symptoms that patients with GI symptoms suffer from are no different from those patients who did not have any problem. In other words, there is no correlation between sleepiness symptoms and GI symptoms. Sleepiness symptoms of the patients in this study were determined, and as expected, no correlation of any sort could be found between their GSRS and ESS scores. Likewise, the MCSDS was used in order to determine divergent validity as well. The findings, as expected, indicated no correlation between GI symptoms and social desirability. Revicki et al. (1998) stated that there was no meaningful correlation between the GSRS, ESS, and MCSDS and suggested that these two instruments show a perfect divergent validity.

**TABLE 5. Pearson Correlation Coefficient Between Gastrointestinal Symptom Rating Scale and Health-Related Quality of Life (N = 150)**

Gastrointestinal Symptom Rating Scale	Physical Function	Limitations in Role (Physical)	Limitations in Role (Emotional)	Social Function	Pain	General Health	Vitality	Mental Health	General Physical Health	General Mental Health
Diarrhea syndrome	-0.123	-0.115	-0.114	-0.111	-0.082	-0.212 <sup>a</sup>	-0.234 <sup>a</sup>	-0.243 <sup>a</sup>	-0.237 <sup>a</sup>	-0.276 <sup>a</sup>
Indigestion syndrome	-0.198 <sup>b</sup>	-0.131	-0.115	-0.133	-0.206 <sup>b</sup>	-0.201 <sup>b</sup>	-0.234 <sup>a</sup>	-0.225 <sup>a</sup>	-0.304 <sup>a</sup>	-0.280 <sup>a</sup>
Constipation syndrome	-0.281 <sup>a</sup>	-0.116	-0.108	-0.144	-0.276 <sup>a</sup>	-0.230 <sup>a</sup>	-0.275 <sup>a</sup>	-0.305 <sup>a</sup>	-0.376 <sup>a</sup>	-0.330 <sup>a</sup>
Abdominal pain syndrome	-0.168 <sup>b</sup>	-0.130	-0.109	-0.172 <sup>b</sup>	-0.201 <sup>b</sup>	-0.396 <sup>a</sup>	-0.165 <sup>b</sup>	-0.327 <sup>a</sup>	-0.320 <sup>a</sup>	-0.352 <sup>a</sup>
Reflux syndrome	-0.186 <sup>b</sup>	-0.174 <sup>b</sup>	-0.169 <sup>b</sup>	-0.214 <sup>a</sup>	-0.093	-0.206 <sup>b</sup>	-0.151	-0.139	-0.236 <sup>a</sup>	-0.270 <sup>a</sup>
GSRS Total	-0.286 <sup>a</sup>	-0.183 <sup>b</sup>	-0.168 <sup>b</sup>	-0.214 <sup>a</sup>	-0.268 <sup>a</sup>	-0.350 <sup>a</sup>	-0.311 <sup>a</sup>	-0.363 <sup>a</sup>	-0.434 <sup>a</sup>	-0.432 <sup>a</sup>

Note. GSRS = Gastrointestinal Symptom Rating Scale.

<sup>a</sup>Correlation at 0.01.

<sup>b</sup>Correlation at 0.05 (two-tailed).

In the present study, GI symptoms were reported to impact general quality of life. Very similar to the results of studies by Revicki et al. (1998) and Kulich et al. (2008), physical and mental health components of the SF-36, which point to the fact that there is a correlation between GI symptoms’ severity and general quality of life, were positively correlated with the GSRS total scores and scores obtained from subdimensions.

### Conclusion

The present study was conducted to provide a Turkish equivalence and establish content validity of the GSRS, originally developed in English, and examine its validity and reliability. The instrument was found to be easily understandable and applicable by patients registered in orthopedic clinics. Test-retest reliability was yielded in the GSRS’s individual item scores, total scores of subdimensions, and total scores of the scale at a positive and meaningful level. The fact that Cronbach  $\alpha$  coefficients and scores related to items were positively and meaningfully correlated with total scores of the GSRS indicates that its Turkish adaptation has a desirable internal consistency. Additionally, there was a statistically meaningful correlation between the GSRS, PAC-QOLQ, and CSI, which were already used as a valid and reliable instrument in Turkish. However, the ESS and the MCSDS were not correlated with the GSRS, which showed that convergent validity results were not gathered by coincidence, and the findings are reliable.

In summary, test-retest reliability, internal consistencies, convergent, and divergent validity of the GSRS have been confirmed. All relevant data indicate that the Turkish GSRS can help individuals assess GI symptoms in a reliable and valid manner. ✪

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