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The Reliability and Validity of the Turkish Version of the Constipation Risk Assessment Scale

ABSTRACT

The aim of this study is to translate into the Turkish language, and test the reliability and validity, of the Turkish version of the Constipation Risk Assessment Scale (CRAS). This study consisted of 245 adult in-patients who were hospitalized in the medical and surgical clinics of Celal Bayar University Hospital in January through May 2007. The patients were categorized into two groups (constipated and not constipated) according to Rome II criteria. All participants were assessed with the CRAS. The CRAS was retested on 32 patients selected randomly from among the initial constipated group (n =152). The statistical analysis consisted of reliability and validity analyses. Test–retest comparison and internal consistency were used to assess the reliability of the instrument. Divergence and known groups approaches were used to test for construct validity. Correlation analysis using the Pearson's coefficient was conducted to assess the test–retest. For testing of the criteria and known groups, Student's t test and Mann–Whitney U test were used. Cronbach's α value for the constipated respondents was r = 61.9. According to the effect size comparisons, the most effective variable on the CRAS score was perception of constipation risk requirement. The overall score and subsection score correlations were also found acceptable (r = 0.47–0.57).

Constipation is defined as a condition of the bowels in which the feces are dry and hard, and evacuation is difficult and infrequent. Most often the criterion of constipation is infrequency of evacuation, which would be less than three bowel movements per week based on studies in normal individuals (American College of Gastroenterology Chronic Constipation Task Force, 2005; Dukas, Willett, & Giovannucci, 2003; Schiller, 2001). The "diagnosis and assessment" of functional constipation and "assessment risk of constipation" are different concepts. The versions of the Rome criteria (II & III) were developed to assist diagnosis of constipation. Constipation can affect individuals at any time of life and can be secondary to other medical problems or may be idiopathic. Some well-known etiology of constipation includes endocrine and metabolic diseases (e.g., diabetes mellitus), neurological diseases (e.g., spinal cord injury) (Bassotti et al., 1998), cancer, those undergoing surgery, and cancer treatment. Other common causes of constipation are rectoanal problems such as anal strictures, iatrogenic conditions such as constipation because of drugs or previous surgery, and dietary factors such as a low residue diet (Abyad & Mourad, 1996; Andromanakos, Skandalakis, Troupis, & Filippou, 2006; Annells & Koch, 2002; Bharucha, Locke, Seide, & Zinsmeister, 2007; Böhmer, Taminiau, Klinkenberg-Knoll, & Meuwissen, 2001; Bosshard, Dreher, Schnegg, & Bula, 2004; Guo et al., 2004; Knowles, Scott, Williams, & Lunniss, 2000;

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Max, Hernandez, Sturpe, & Zuckerman, 2007; Mertz, Naliboff, & Mayer, 1999; Schiller, 2001; Stark, 1999; Talley, Jones, Nuyts, & Dubois, 2003; Winge, Rasmussen, & Werdelin, 2003; Wisten & Messner, 2005; Wong, Wee, Pin, Gan, & Ye, 1999). Lifestyle choices, some medications such as chemotherapy, iron supplements, antidepressants, and pregnancy can also be listed as risk factors for constipation (Cullen & O'Donoghue, 2007; Richmond & Wright, 2004). Female gender can be regarded as a risk factor for constipation. Young and middle-aged adults with idiopathic constipation are almost exclusively women (El-Salhy, 2003).

"Assessment risk of constipation" might be measured by taking all of these risk factors into account individually. Another proposed approach is to use well-structured risk assessment scales that cover multirisk factors of constipation. In nursing literature, there have been relatively few attempts to measure risk assessment of constipation other than that reported by Zernike and Henderson (1999) whom developed a tool for Australian patients to identify risk of constipation.

The Constipation Risk Assessment Scale (CRAS), the focus of this article, was developed by Richmond and Wright (2005) to satisfy the need for the assessment of an individual's risk of developing constipation. This instrument provides an objective method to enable identification of those individuals at risk of constipation so that preventative interventions can be implemented. Richmond and Wright (2004) published a literature review that provided the rationale for developing the CRAS and described the development process of CRAS in this same article. The results of their reliability and validity analyses were published in 2008 (Richmond & Wright, 2008). CRAS was also modified by Isenring, Bauer, and Capra (2005) for patients exposed to radiotherapy.

Supplementary to the Rome II criteria, there are several clinician-rating scales for assessing the severity of constipation such as the Constipation Scoring System and the Constipation Assessment Scale (Chan et al., 2005), Modified Constipation Assessment Scale (Isenring et al., 2005), Constipation Assessment Scale for Pregnancy (Broussard, 1998), and New Questionnaire for Constipation and Fecal Incontinence (Bharucha et al., 2007). In addition, Varma et al. (2008) validated the Constipation Severity Instrument, and McMillan and Williams (1999) validated the Constipation Assessment Scale.

No questionnaires measuring risk of constipation have been developed in Turkish, and none of the available international tools have been translated into and validated for Turkish until now. We therefore decided to adopt the CRAS into Turkish and develop a colloquial version of the CRAS.

Materials and Methods

Study Subjects

The subjects of this study were 245 adult inpatients who were hospitalized in the Medical and Surgical Clinics of Celal Bayar University Hospital in the period January to May 2007. The participation rate was 81%. The study was granted ethics approval by the Ethics Committee of Celal Bayar University. The questionnaire was administered at the clinic during the first visit with informed consent.

Constipation Criteria

In our study, the patients were all categorized into two groups (constipated and not constipated) according to the Rome II criteria (American College of Gastroenterology Chronic Constipation Task Force, 2005).

Chronic constipation defined by the Rome II criteria is as follows—at least 12 weeks, which need not be consecutive, in the preceding 12 months with two or more of the following conditions: (1) fewer than three bowel movements per week, (2) straining at stool more than 25% of the time, (3) passage of lumpy or hard stools more than 25% of the time, (4) sensation of incomplete evacuation for more than 25% of the time, (5) sensation of anorectal obstruction/blockage for more than 25% of the time, and (6) manual maneuvers required to facilitate defecation more than 25% of the time. In addition, loose stools are not present (Chan et al., 2005).

Constipation Risk Assessment Scale

The CRAS is a composite scale developed for the assessment of constipation risk. The scale is composed of 33 items with a possible range of overall index score 1 to 63. The overall score is categorized into three constipation risk groups: 1 through 10 refers to "low risk"; a score between 11 and 15 refers to "moderate risk"; and 16 and over indicates "high risk." Although this is a composite scale, it was also divided into four subsections relating to the risk factors associated with the development of constipation (Richmond & Wright, 2004, 2005).

Linguistic Validation Steps

In this study, the standard methodology of the International Quality of Life Assessment protocol for linguistic validation of quality of life (QOL) questionnaires (Cull et al., 2002) was used.

Translation

The process of Turkish adaptation of the CRAS included the following steps:

1. The first stage was to obtain a translation permission, which was obtained from the developer of the original scale (Richmond & Wright, 2004).
2. Two independent forward translations into Turkish were done by two native linguistic specialists. Both translators were blind to the other's translation text.
3. A consensus forward version was developed by two specialists who are highly skilled in English.
4. This consensus forward version was back-translated into English by a bilingual person; the backward version and the original text were compared by an independent supervisor. None of the items of the Turkish text needed any modification at this stage.

Cognitive Debriefing

A cognitive debriefing session (i.e., face-to-face interview focusing on the conceptualization and colloquialism of the Turkish translation) was conducted on five constipated patients and five nurses. No item was revised in the light of the suggestions of the participants and all of the items were left as they were in these sessions so that the final Turkish version was approved as a sound version (face validity approval).

Field Testing

For all subjects, the CRAS and Rome II criteria were applied. The CRAS was further retested on 32 patients selected randomly from among the initial constipated group ($n = 152$). The assessment of constipation risk using the CRAS was done by health professionals (proxy) in the clinic rather than by the patients themselves.

Statistical Analysis

The statistical analysis consisted of reliability and validity analyses. Although the original instrument is a composite index, we also performed reliability and validity analysis on the four subsections constructs as well.

Reliability Analysis

Two different methods were used to assess reliability of the instrument: test–retest comparison and internal consistency. Test–retest comparisons using intraclass correlation coefficients (ICCs) as advised by Kirkwood and Sterne (2003) were done on 32 constipated patients. The test–retest sample size is predefined as at least 30 patients based on Central Limit Theory (Dawson-Saunders & Trapp, 1990). These 32 patients were the first 32 patients who applied to the clinic during the study period and were diagnosed as constipated by the Rome II assessment. The second visit was done at their homes to allow a 4-week washout period between two consecutive visits.

All of the subsections except "experience of hospitalization" were validated by using test–retest reliability approach. Being a dichotomous variable, the reliability of the "experience of hospitalization" subsection was assessed by an observed consistency (rate of agreement) approach. Internal consistency assessment was done by calculating Cronbach α values for 152 patients. ICCs and α values between .50 and .75 were considered moderate reliability, with over .75 indicating good internal consistency (Portney & Watkins, 1993).

Validity Analysis

Validity of the scale was tested by criterion and construct validity approaches. The Rome II subscore comparison was used to test the criterion validity of the scale at first hand. In addition to these comparisons, two benchmark questions extracted from CRAS, which considered "perceived constipation" and "laxative using experience" was used for criterion validity. Sensitivity, specificity, and positive and negative predictive values were calculated during this criterion validity analysis.

As for construct validity testing, divergence, and the known groups approaches were used. The subsection scores of the CRAS were correlated to show the expected divergence of the scale. In the items with categorical responses such as the hospital experiences subsection, the percentages of agreement were given as well.

The known groups method demonstrates whether a test can discriminate between individuals that are known to have the trait and those that do not. Therefore, the validity of a particular test is supported if the test's results demonstrate these known differences. Sex, age, and mobility variables were used for the known groups validity of the scale.

Student's t test and Mann–Whitney U tests together with "effect size" (ES) statistics (Cohen, 1988) were used during testing of the criteria and known groups validities where appropriate. Effect size was calculated by the formula: ES "d" = [(mean 1–mean 2)/common standard deviation]. Effect size evaluation scale: ES of 0.20 = small; 0.50 = medium; and 0.80 = large according to Cohen (1988). The contribution of the subsections of the CRAS on the total scale score were assessed by conducting multiple linear regression analysis. Divergence of the scale was shown by Spearman's ρ. The data were analyzed using the SPSS 13.0 statistical package.

Results

Subjects

The mean age of the subjects was 55.69 ± 15.61 years, 59.2% were female, 75.5% were married, 44.9% had graduated primary school, and 55.5% were housewives. Social security coverage of the subjects was 90.2% and only 10.2% had done shift work. Most (54.7%) of the respondents evaluated their lifestyle as passive. Of the inpatients, 37.6% were hospitalized in the general surgery department. Distribution of the subsections and overall scale scores of the respondents is presented in Table 1.

Reliability Analysis

Test–retest results revealed a satisfactory consistency on the overall CRAS score (ICC = 0.59), whereas the highest consistency was detected on the physiological/psychological conditions subsection of the scale (ICC = 0.89) (Table 2). Test–retest comparisons of the medications subsection scores revealed a weak ICC, but a satisfactory percentage of agreement (56.3%). On the contrary, the Cronbach's α value for the constipated respondents was 61.9.

Validity Analysis

Two types of validity are tested in this study: criterion validity and construct validity. The criterion validity of the

TABLE 1. Distribution of Subsections and Overall Scale Scores of the Respondents ($N = 245$)

Subsection	Mean ± SD Score	Median (min–max)
Lifestyle	6.53 ± 1.79	7.0 (1–10)
Experience of hospitalization	NA	NA
Physiological/psychological conditions	2.59 ± 2.58	3.0 (0–12)
Medications	2.76 ± 2.36	3.0 (0–13)
Overall scale	12.37 ± 4.18	12.0 (2–25)

Note. NA = nonapplicable.

Turkish version of the CRAS is presented in Table 3. Presence of constipation according to the Rome II criteria, perception of constipation risk, and previous experience of laxative use produced higher CRAS scores than their counterparts (Table 3). According to the effect size comparisons, the most effective variable on the CRAS score was perception of constipation risk (ES = 0.83).

The criterion validity results are duplicated by using the CRAS cutoff values suggested by the developer of the scale in Table 4. CRAS cutoff values classify constipation as "low," "medium," and "high" risk groups, whereas Rome II distinguishes two groups, "constipated" and "nonconstipated." To calculate the sensitivity, specificity, and predictive values of these cutoff values, we dropped the CRAS groups from three to two in two different models of combinations: the first combination model is composed of "low risk" versus "medium + high risk"; and the second combination is composed of "low + medium risk" versus "high risk." The sensitivity, specificity, positive, and negative predictive values for the first combination model were 74.0, 56.6, 67.0, and 72.0, respectively. On the contrary, the sensitivity, specificity, and positive and negative predictive values for the second combination model were as follows, respectively: 25.5, 92.5, 69.0, and 71.0. These figures indicate that the sensitivity of the first combination model was better than the second model, whereas the specificity of the second combination model was better than the first model.

Construct validity of the scale was tested by the known groups method as shown in Table 5. Younger age, being female, and inactive lifestyle produced significantly ($p < .05$) high CRAS scores, as expected.

The intercorrelations among the CRAS subsection scores and the overall scale score are presented in Table 6 as a measure of divergence of the scale. The overall score and subsection score correlations were also found acceptable (0.47–0.57). Divergence of the subsections is obvious since there are almost no relationships between subsections of the CRAS. Finally, the linear regression analysis results in which the CRAS overall score was taken as a dependent variable showed that the "physiological/psychological conditions ($\beta = .52$)" and "medications

TABLE 2. Test–Retest Results of CRAS Scores ($n = 32$)

	Lifestyle	Experience of Hospitalization	Physiological/ Psychological Conditions	Medications	CRAS Score
Lifestyle	0.57[a]				
Experience of hospitalization		(59.4%)[b]			
Physiological/ psychological conditions			0.89[a]		
Medications				(56.3%)[b]	
CRAS overall score					0.56[a]

Note. CRAS = Constipation Risk Assessment Scale.
[a]Intraclass correlation coefficients were significant at the .001 level.
[b]Figures in parentheses refer to percentage of agreement.

TABLE 3. Comparisons of the Overall CRAS Scores Between Constipated and Nonconstipated Groups and Between Those Who Perceived Constipation Risk and Those Who Did Not

Group	*n*	Mean Overall CRAS Score (Effect Size)[a]	*p*[b]
Constipated Group (Rome II+)	152	13.50 ± 3.99	< .001
Control Group (Rome II–)	93	10.50 ± 3.83	
		(0.72)	
Perceived constipation risk			
Yes	217	12.76 ± 4.10	< .001
No	28	9.25 ± 3.46	
		(0.83)	
Previous laxative use experience			
Yes	107	13.26 ± 4.18	< .01
No	136	11.70 ± 4.08	
		(0.37)	

Note. CRAS = Constipation Risk Assessment Scale; Rome II+ = constipated, per the Rome II criteria; Rome II− = not constipated, per the Rome II criteria.
[a]Effect Size = ([mean 1–mean 2]/common standard deviation).
[b]Student's *t* test.

(β = .55)" subscales make the highest contribution to the variation of the overall CRAS score.

Discussion

The use of a risk assessment scale for constipation reduces the incidence of constipation in patients. As Zernike and colleagues proposed, our study results support that patients should be evaluated for the risk of developing constipation (Zernike & Henderson, 1999). Their Australian constipation risk assessment tool is similar to that of Richmond and Wright's (2004) Constipation Risk Assessment Scale (CRAS). Both scales were developed

TABLE 4. Criterion Validity of the CRAS Cutoff Values According to the Rome II Criteria for Constipation

Levels of Risk Constipation of Patients According to CRAS Cutoff Values	Rome II+ "Constipated" *n* (%)	Rome II− "Nonconstipated" *n* (%)	Total *n* (%)	Odds Ratio (95% Confidence Interval)
Low risk	34 (42.5)	46 (57.5)	80 (100.0)	1.00
Medium risk	72 (64.3)	40 (35.7)	112 (100.0)	2.44
				(1.35–4.39)
High risk	46 (86.8)	7 (13.2)	53 (100.0)	8.89
				(3.58–22.1)
TOTAL	152 (62.0)	93 (38.0)	245 (100.0)	—

Note. Chi-square for trend = 26.9, $p = .0001$. CRAS = Constipation Risk Assessment Scale; Rome II+ = constipated, per the Rome II criteria; Rome II− = not constipated, per the Rome II criteria.

TABLE 5. Comparison of the Characteristics of Patients and Predefined Risk Levels of CRAS

Characteristics of Patients	Risk Levels of CRAS[a]			
	Low *n* (%)	Medium *n* (%)	High *n* (%)	Chi-square/ANOVA
Age	53.87 ± 15.84	56.81 ± 16.18	56.09 ± 13.95	<0.05[b]
				Low < (Medium = High)[c]
Sex				
Female	29.0 (42)	41.4 (60)	41.4 (43)	<0.001[d]
Male	38.0 (38)	52.0 (52)	10.0 (10)	
Education				
Low	27 (32.9)	38 (46.3)	17 (20.7)	>0.05[d]
High	53 (32.5)	74 (45.4)	36 (22.1)	
Operation conditions				
Operated on	41 (34.2)	59 (49.2)	20 (16.7)	>0.05[d]
No operation	39 (31.2)	53 (42.4)	33 (26.4)	
Mobility				
Active	47 (42.3)	42 (37.8)	22 (19.8)	<0.01[d]
Passive	33 (24.6)	70 (52.2)	31 (23.1)	
Difficulty evacuating bowels in hospital toilets				
Yes	9 (13.8)	28 (43.1)	28 (43.1)	<0.001[d]
No	71 (39.4)	84 (46.7)	25 (13.9)	

Note. CRAS = Constipation Risk Assessment Scale.
[a]< 10 = low risk; 11–15 = moderate risk; >15 = high risk.
[b]ANOVA.
[c]Post hoc comparison (Tukey's B).
[d]Chi-square.

based on the same theoretical construct. In both of the scales, activity/mobility, food intake, fiber intake, taking medications, and frequency of bowel motion are common dimensions. In addition to these core dimensions, Richmond and Wright (2004) added sex, certain physiological conditions, and personal beliefs to the CRAS.

The reliability of the Turkish version of the CRAS was demonstrated using the test–retest and internal consistency approaches. The test–retest reliability was assessed by ICC for numerical variables and by rate of agreement for categorical variables. Satisfactory ICC and/or percentages of agreement results for overall scale score and for each of the four subsections of the Turkish CRAS were obtained. These figures are very close to those obtained in the original validity article (Richmond & Wright, 2008). The test–retest reliability of use of hospital toilets, bedpans, and medications items was tested by percentage of agreement (Kappa test), since these two items are dichotomized items. On the contrary, although within acceptable limits, the Cronbach's α value of our sample is smaller (α = 61.9) than that obtained in the original Richmond and Wright (2004) study (α = 73.0). This discrepancy may be attributed to the dichotomous nature of the items.

The validity of the Turkish CRAS was tested by criterion validity and construct validity. Criterion validity is one of the most crucial features of clinical performance (Cohen, 1988). Criterion validity of the scale was evaluated by three different approaches: (1) comparing Rome II positive patients with Rome II negative patients, (2) comparing the patient groups in regard to perceived constipation risk, and (3) comparing the patient groups for previous laxative experience.

We used different approaches from the original validation article by using different criteria for testing criterion validity. In this study, Rome II criteria and patient's perceived constipation risk were used as a criterion of constipation, unlike in Richmond and Wright's study where nurses' risk assessment of constipation was used

TABLE 6. Correlation Matrix Among CRAS Subsection Scores and Overall Score (n = 114)

	Lifestyle	Experience of Hospitalization	Physiological/ Psychological Conditions	Medications	CRAS Overall Score
Lifestyle	1.000	.134	.179[a]	.083	0.50[b]
Experience of hospitalization		1.000	.116	.031	0.45b
Physiological/psychological conditions			1.000	–.058	0.57[b]
Medications				1.000	0.47[b]
CRAS Overall Score	.41[c]	.32[c]	.52	.55[c]	1.00

Note. CRAS = Constipation Risk Assessment Scale.
[a]Spearman's ρ is significant at the .05 level (two-tailed).
[b]Spearman's ρ is significant at the .001 level (two-tailed).
[c]Linear regression results (β values) (CRAS overall score is considered as dependent variable).

(Richmond & Wright, 2008). Nurses' risk assessment might be regarded as a good proxy criterion, but concrete evidence is needed to show the superiority of this evaluation over patients' self-perception. In the absence of this evidence, we preferred to use patients' self-perception and Rome II criteria. Another reason why we used patients' self-perception and Rome II criteria is the cross-sectional nature of this study. If we were to conduct a longitudinal intervention design, then we would test the predictive validity as was done by Richmond and Wright (2008). Although laxative experience was not regarded as a constipation risk factor in the literature (Hyde, Jenkinson, Webb, & Koch, 1999; Richmond & Wright, 2005), we used this indicator as a proxy variable for constipation and saw that it really worked (Table 3).

Any clinical performance indicator(tool should at least be responsive to change or sensitive to discrete groups such as "constipated" or "nonconstipated" categorizations in the Rome II criteria, as seen here. The criterion that will be potentially used for the assessment of criterion-related (predictive) validity should be as good as it can. Rome criteria are very popular constipation criteria used in clinical practice worldwide (American College of Gastroenterology Chronic Constipation Task Force, 2005). For this reason, we used the Rome II criteria in our study as well.

Overall, the CRAS, as a continuous score, discriminated Rome II positive and negative groups of patients well, indicating a third way of showing the criterion validity of the CRAS. The CRAS was also categorized by the developers, and criterion validity was also assessed by two different models of categorizations by using Rome II criteria. As mentioned in the results section, for the first combination model, in which 10 points was taken as a cutoff point for dichotomization (i.e., low risk vs. medium + high risk), the sensitivity was 74.0% and specificity was 56.6%, whereas specificity of the second combination model, in which 15 points was taken as a cutoff point for dichotomization (i.e., low + medium risk vs. high risk), was perfect (92.5), but sensitivity was inacceptable (25.5). On the basis of these criteria, validity figure dichotomization by 10 points cannot be regarded as perfect for both sensitivity and specificity, but dichotomization by 15 points can perfectly detect nonconstipated patients.

Mean overall CRAS scores between the two categories of the first item of the personal beliefs subsection of the CRAS are significantly different from each other. The same result is obtained when we compare mean overall scores between two categories of the second item of the CRAS. In other words, the Turkish version of the CRAS was perfectly sensitive to objective and subjective risk of constipation among patients.

The construct validity of the CRAS was tested by using divergence and known groups' approaches. As shown in Table 6, the scale gave a good divergence between subdimensions. On the contrary, the overall CRAS score was better explained by medications (β = .55) and psychological and physiological conditions (β = .52) than use of hospital toilets (β = .32) and lifestyle dimensions (β = .41). The deterministic effects of medications and psychological and physiological conditions on constipation are already expected, based on the organic etiology of constipation (Ron, Leibovitz, Monastirski, Habot, & Segal, 2002). Nevertheless, the lifestyle dimension should not be neglected based on these results.

A similar relationship between constipation and lifestyle factors is described in the literature as well (Duffy & Zernike, 1997; Dukas et al., 2003; Isenring et al., 2005; Joos, Woehl, & Hickam, 2005; Kaçmaz & Kasıkçı, 2006; Kyle, 2007; Morad, Nelson, Merrick, Davidson, &

Carmeli, 2007; Okubo et al., 2007; Pare, Ferrazzi, Thompson, Irvin, & Rance, 2001; Richmond & Wright, 2004; Wisten & Messner, 2005; Wong et al., 1999). These results show that, in addition to organic causality of constipation, lifestyle factors should be taken into consideration during risk prediction of constipation. These findings also confirm the construct and, to some extent, the content validity of the Turkish CRAS.

The known groups approach was used as a second way of testing the construct validity of the CRAS. Age, sex, level of education, exposure to recent surgical procedure or not, and perceived level of mobility were the external variables used in this approach. Our findings revealed significant relationships between sex, mobility, and the CRAS. The two variables of sex and mobility that were already included in the CRAS score were also consciously tested as "known groups," since female sex (Dukas et al., 2003; Fajardo et al., 1998; Mason, Serrano-Ikkos, & Kamm, 2000; Jacobs & Pamies, 2001; Tuteja, Talley, Joos, Woehl, & Hickam, 2005) and low level of mobility (Dukas et al., 2003; Joos et al., 2005) are the consensus variables mentioned in the literature for the risk of constipation. Age would also be expected to be effective on the constipation risk if the age distribution of our sample (mean age = 55.69 ± 15.61) included older age groups because older age is known to be highly related to experience of constipation. This is mainly because of the association of a higher prevalence of chronic disease with age (Morad et al., 2007; Winge et al., 2003; Zernike & Henderson, 1999).

Limitations

A number of limitations may be raised for this study. This is the first study in which the CRAS was piloted in a different language and cultural context from the original language. So, the results of our study, based on some articles that were different from the original developers', need to be evaluated by further research in different contexts and by using different criteria.

The cross-sectional design of this study may be a limitation of this study, since the future constipation experience could not be evaluated using a before—after model, which can be regarded as a very important issue for responsiveness to change. Another restriction of our study is the lack of oncology patients in the patient profile, since medications used in oncology have been a significant risk for constipation.

A particular strength of our study is the representativeness of this study sample. A large percentage of patients who were hospitalized in Celal Bayar Hospital in the study period agreed to participate in this study (85%). The age and education profile of the study sample is also very representative and comparable with the general Turkish population (Turkish Survey, 2008).

Conclusion

This study demonstrated the Turkish version of the CRAS is reliable and valid for Turkish inpatients. The reliability of the Turkish version of the CRAS was demonstrated using the test–retest and internal consistency approaches. The validity of the Turkish CRAS was tested by criterion validity and construct validity. Rome II criteria and patient's perceived constipation risk was used as a criterion of constipation. The Turkish version of the CRAS was perfectly sensitive to objective and subjective risk of constipation among patients. Clinicians can confidently use the Turkish version of the CRAS to evaluate constipation risk in Turkish-speaking patients. ✪

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