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Cross-cultural adaptation, validity, and reliability of the Turkish version of revised American Pain Society patient outcome questionnaire for surgical patients

Cerrahi hastalar için gözden geçirilmiş Amerikan Ağrı Derneği hasta sonuçları anketi'nin Türkçe versiyonu: Geçerlik ve güvenirlik çalışması

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Summary

Objective: This study aims to investigate the validity and reliability of the Turkish Revised American Pain Society Patient Outcome Questionnaire (APS-POQ-R-TR).

Methods: A methodological and cross-sectional design was used. This study included a total of 250 surgical patients (98 males, 152 females) between January 2015 and January 2016. Data were collected using a demographic questionnaire and the APS-POQ-R. Language equivalence, content and construct validity, and reliability of the scale were evaluated.

Results: The Pearson correlation coefficient of the scale for parallel test reliability was 0.362, and the Cronbach's alpha value was determined as 0.88 in the APS-POQ-R-TR. According to fit indexes of the confirmatory factor analysis [x2/SD=362.53/125=2.90; RMSEA=0.087 (90% CI: 0.077–0.098); CFI=0.95; IFI=0.95; NNFI=0.94], three factors were found to be appropriate for the APS-POQ-R-TR.

Conclusion: The adaptation of the translated APS-POQ-R in Turkey is reliable and valid to measure and evaluate the quality of postoperative pain management in the Turkish population.

Keywords: APS-POQ-R; pain management; postoperative pain; reliability; validity.

Özet

Amaç: Bu çalışmanın amacı Gözden Geçirilmiş Amerikan Ağrı Derneği Hasta Sonuçları Anketi (Revised American Pain Society Patient Outcome Questionnaire -APS-POQ-R)'nin Türkçe'ye uyarlanması, geçerlilik ve güvenirlik çalışmalarının yapılmasıdır.

Gereç ve Yöntem: Metodolojik ve kesitsel tipteki bu araştırma, Ocak 2015 ve Ocak 2016 yılları arasında yapılmış olup, toplam 250 cerrahi hasta ile yürütülmüştür. Veri toplama formu olarak demografik verileri içeren anket formu ve "Gözden Geçirilmiş Amerikan Ağrı Derneği Hasta Sonuçları Anketi" kullanılmıştır. Anketin, dil geçerliliği, kapsam ve yapı geçerliliği, güvenirlik analizleri yapılmıştır.

Bulgular: Cronbach's Alpha değeri 0.88 olarak hesaplanan Türkçe Gözden Geçirilmiş Amerikan Ağrı Derneği Hasta Sonuçları Anketi'nin doğrulayıcı faktör analizi uyum indekslerine göre, [x2/SD=362.53/125=2.90; RMSEA=0.087 (%90 CI:0.077–0.098); CFI=0.95; IFI=0.95; NNFI=0.94], üç faktörlü yapısının uygun olduğu bulunmuştur.

Sonuç: Gözden Geçirilmiş Amerikan Ağrı Derneği Hasta Sonuçları Anketi, Türk toplumunda postoperatif ağrı yönetiminin kalitesini ölçmek ve değerlendirmek için, güvenilir ve geçerli bir ölçektir.

Anahtar sözcükler: Amerikan Ağrı Derneği Hasta Sonuçları Anketi; ameliyat sonrası ağrı; ağrı yönetimi; geçerlik; güvenirlik.

Introduction

Approximately 75% of patients experience moderate to severe pain in the postoperative period.[1, 2] Uncontrolled pain prevents them from activities such as deep breathing, coughing, mobilization, and sleeping, which delays recovery and disrupts patients' comfort.[3,4] Ineffective postoperative pain management can increase the length of hospital stay, increase healthcare costs, and restrict patients' activities of daily living, thus prolonging postoperative recovery.[5, 6]

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To decrease pain-related discomfort of patients and the length of hospital stay, adequate pain management should be provided, and the efficiency of pain management should be evaluated. Pain management evaluation increases healthcare professionals' awareness and enables them to provide effective, patient-specific analgesic methods.[7, 8] The effect of pain on activities such as mobilization and sleep, the emotional state of patients, and adverse effects of the analgesic drugs that are used should be evaluated. The current pain scales only evaluate pain severity (such as verbal and numeric rating scales) or characteristics (such as the McGill pain questionnaire). However, the effect of analgesia on patients and their satisfaction cannot be assessed by these scales. Therefore, it can be impossible to evaluate the effect of pain and analgesia in a functional capacity.

Measuring patient satisfaction in the evaluation of clinical application results is recommended by pain management guidelines.[9, 10] The American Pain Society (APS) added questions on patient satisfaction (including physician and nurse behavior and causes of patient's refusal to take analgesics) to the pain guideline, and the final version of the questionnaire was named as the Revised American Pain Society Patient Outcome Questionnaire (APS-POQ-R) in 2010. This questionnaire evaluates the incidence of pain, severity of pain at rest and during daily activities such as walking, turning in bed, and falling asleep, analgesia protocol that healthcare professionals apply, adverse effects of analgesia (such as nausea and numbness), emotional state (such as anxiety, anger, and fear) of patients during pain, and patient satisfaction.[11, 12]

Although the APS-POQ-R has shown high reliability and validity among different populations for illnesses such as chronic non-cancer pain,[13] it has also been extensively applied in the assessment of surgery-related pain.[14, 15] In addition, evidence-based practice guidelines recommend that the APS-POQ-R can be used for pain assessment in patients with surgery-related acute pain.[8] With the exception of the Brief Pain Inventory (BPI), there is no comprehensive and validated instrument for pain assessment in Turkey.[16] The APS-POQ-R has been validated in several languages, but a validated Turkish version has not been available until now. To provide effective pain management, the nurse, who has the responsibility of pain management, should monitor the effect of pain not only at rest but also during daily activities and evaluate patient satisfaction, thus establishing holistic nursing care in pain management. The use of the Turkish APS-POQ-R (APS-POQ-R-TR), which provides holistic pain evaluation, can contribute to pain management in Turkey.

Testing the reliability and validity of the APS-POQ-R in a Turkish population would help nurses and other health professionals assess pain severity and functional capabilities of patients after surgery in Turkey and would contribute to pain management. Therefore, in the present study, we aimed to determine the cross-cultural adaptation, validity, and reliability of the APS-POQ-R-TR to assess pain in patients undergoing surgery in Turkey.

Ethical considerations

We intended to obtain a written permission for the use of the scale; however, no permission is requested by the APS. A written informed consent was obtained from all patients for the use of clinical data in research. In addition, written permission was obtained from the administration of the university hospital where the study was conducted. The study protocol was approved by the Gazi University Faculty of Medicine Ethics Committee (Date:14.04.2014/Number:192). All participants were fully informed about the nature and aim of the study, and a verbal informed consent was obtained from each. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Material and Methods

Study design

This study was conducted between January 2015 and January 2016 using a methodological and cross-sectional design.

Setting and participants

In the adaptation of an instrument for use in another culture, a sample amount should be at least two-fold (preferably at most 10-fold) of the scale article number.[17] For the APS-POQ-R, which comprises 21 items (18 primary and 3 secondary items), the number of individuals in the sample group was 10-fold more than the article number. Therefore, sample selection technique was not used in the study. A total of 250 patients who agreed to participate in the study and

fully completed the forms between January 2015 and January 2016 were included in the study.

Study sample

The sample group of this methodological and cross-sectional study comprised 250 patients who were hospitalized after surgery in general surgery, cardiovascular surgery, pulmonary surgery, brain surgery, urology, orthopedics, and traumatology clinics of a university hospital in Turkey. Patients who completed 24 h postoperatively, spoke fluent Turkish, were conscious, and aged >18 years were included in the sample group. Patients aged <18 years old and those with cognitive and communicative disabilities (i.e., hearing or speaking) were excluded from the sample group.

Data collection

Data were collected using face-to-face interviews at the university hospital in Ankara from seven surgical wards. The researchers screened all patients to identify those who fulfilled the inclusion criteria. All patients were informed about the study by one of the researchers, and a verbal informed consent was obtained from each participant. All patients completed the questionnaire form. If necessary, the patients were offered assistance with filling out the questionnaire. A total of 250 questionnaires were used for data analysis.

The data of the postoperative 24 h were collected to measure the quality of postoperative pain management and daily activities during the first 24 h of patient care. We used the parallel analysis to select a number of factors to retain within each solution, which is indicated in the literature to be more accurate in identifying the correct number of factors than traditional methods. Three instruments were used to collect data: a sociodemographic data form, the Turkish version of the Brief Pain Inventory (BPI-TR), and the APS-POQ-R. The mean time for all completion of the instruments was 10 (range: 7–15) min.

Instruments

Demographic and surgical data: Sociodemographic data included age, sex, education level, chronic disease, previous operation type, pain experiment, and surgical data. Surgical data, including anesthesia type, current surgery type, operation time, analgesia during surgery, and analgesia in post-anesthesia care unit data were collected.

The BPI-TR: The BPI[16] was used for comparison because both questionnaires (The BPI and APS-POQ-R) contain many of the same questions. The BPI-TR consists of four questions on pain severity and seven questions on interference of pain with functions and activities (i.e., general activity, mood, walking ability, deep breathing-cough exercise, relations with other people, sleep, and enjoyment of life), with scores ranging from 0 to 10.[16] The values of satisfaction with treatment scale were 0 for extremely dissatisfied and 10 for extremely satisfied. Total scores on the subscale of pain interference with functions were calculated by adding the scores for each item on pain interference. In addition, there were numerical scales for seven functional interference factors, a question on pain medication, and the map of the human body for locating areas of pain. The BPI-TR is brief, self-administered, and easily understandable. Cronbach's alpha value of the BPI ranges in the original version from 0.77 to 0.971[18] and the BPI-TR from 0.79 to 0.80.[19]

The APS-POQ-R: The APS-POQ-R was developed to measure the quality of postoperative pain management during the first 24 h of patient care in the adult healthcare setting. The APS-POQ-R contains 18 primary and 3 secondary items. Primary items measure pain severity; time spent in severe pain; the impact of pain on patients' physical activity, sleep, and affect; adverse side-effects of the treatment; and patients' perceived pain relief; level of participation allowed in treatment; and satisfaction with treatment. Secondary items measure the use of non-pharmacological methods to reduce pain and the perceived helpfulness of treatment information received during care. With the exception of items assessing time spent in severe pain and the amount of pain relief received, which are anchored between 0% and 100%, primary APS-POQ-R items are measured on a 0–10 numeric rating scale. The APS-POQ-R-TR was used in our study.

Procedure

The time frame for responses was the first postoperative 24 h. In some studies, patients were asked to recall the past 24 h before the interview rather than their first 24 h of postoperative care.[14, 20] However, some patients were unable to remember their pain within the first 24 h in the following days. Therefore, in our study, the scale was performed by the 48th h at the latest.

Validity and reliability analysis

In the validity study of the scale, language equivalence, structure, and content validity of the scale were evaluated. To identify the internal consistency of the scale's reliability, calculation of Cronbach's alpha coefficient and item analysis methods were used.

Language equivalence: For language validity, permission was obtained from Deb Gordon,[8] one of the authors who developed the scale, via e-mail. For language and meaning validity, the APS-POQ-R was translated from English to Turkish by three linguists and the texts were then evaluated by researchers to ascertain which would best describe the scale in Turkish. Because the equivalence of articles must be confirmed in the original and translated forms, the opinions of 10 expert algologists, who were fully proficient in both languages, were obtained. The experts were asked to rate between 1 and 10 (1=not appropriate, 10=completely appropriate) to evaluate the appropriateness of the translated scales according to the original scale. The suitability of the expert opinions was analyzed using Kendall's W analysis test. The content validity of the scale was evaluated, and no statistical difference was found between the points given by the experts (Kendall's W=0.83; p>0.01), and a consensus was reached among the experts. The Turkish form was then translated back into English by three linguists, and the similarity between the final translation and the original scale was analyzed. We performed pre-application of the APS-POQ-R-TR with 25 people to obtain the intelligibility of the articles of the patients and we obtained no negative feedback. Data of the people involved in the pre-application were not included in the study. For validity and reliability studies, we decided on a large sample size (n=250).

Construct validity: Confirmative factor analysis was used in the evaluation of the construct validity of the scale. According to fit indexes of the confirmatory factor analysis [×2/standard deviation (SD)=362.53/125=2.90; RMSEA=0.087 (90% confidence interval [CI]: 0.077–0.098); CFI=0.95; IFI=0.95; NNFI=0.94], three factors were found to be appropriate for the APS-POQ-R-TR. We measured the sampling adequacy using the Kaiser–Meyer–Olkin (KMO) test and Bartlett's test of sphericity.

Content validity: Confirmatory principal component analysis with a varimax rotation and pair-wise exclusion was used.

Statistical analysis

Statistical analysis was performed using the SPSS Statistics version 20.0 software (IBM Corporation, Armonk, NY, USA). Descriptive statistics (n, %, mean, SD) were used to report responses to the APS-POQ-R-TR items, the feasibility questionnaire, and the demographic data. Language equivalence, content validity, reliability, and construct validity of the scale were evaluated. Content validity was tested by requesting the experts' opinions.[14] Therefore, five components were extracted using the principal component analysis with a varimax rotation to confirm the construct validity of the questionnaire. Cases were excluded pair-wise in case of missing data for a particular analysis. We assessed the internal consistency of the APS-POQ-R-TR and factor item sets, based on Cronbach's alpha, corrected item–total correlation coefficients, and the improvement to Cronbach's alpha following the removal of each item. To ensure that all items included in the reliability analysis were scored in the same direction, we replicated the method used by Gordon et al.[8] and Botti et al.[20] and reverse-scored items in which lower scores indicated poorer outcomes. To determine the suitability of the sample size for factor analysis, KMO and Bartlett's tests of sphericity were used.[14]

The Pearson correlation coefficient was used to analyze the correlations among the factors. Testing of the psychometric properties of the APSPOQ-R-TR was conducted following the approach used by Gordon et al.[8] in testing the APS-POQ-R. Exploratory principal component analysis was used to extract components following the initial testing because the results from the confirmatory analysis were unable to entirely confirm the results found in the U.S. study.[8] These two scales rated from 0% to 100% were converted to 0 to 10 values, and the mean scores and SDs were calculated for each subscale.[8] A p value of <0.05 was considered statistically significant.

Results

Participants

Of 250 postoperative patients, all (100.0%) completed the APS-POQ-R-TR. The mean age was 49.54 years (range: 18–82 years). More than half of the patients were female and literate or primary school graduates. A proportion comprising 43.6% of the patients had at least one chronic disease such as hypertension, diabetes mellitus, or asthma. More than half

of the patients previously underwent surgery and experienced pain. In addition, 168 patients (67.2%) had moderate and severe pain (5–10) in the first 15 min after the surgery. A large majority of the patients underwent general anesthesia and traditional open surgery. A proportion comprising 79.6% of the patients were not given analgesia during the surgery, whereas 48.4% of the patients received analgesia in the post-anesthesia care unit.

Initial testing of the validity and reliability of the APS-POQ-R-TR

Construct validity: In the study, sampling adequacy as a KMO value was 0.857, and Bartlett's test of sphericity value ($\chi 2=2109.92$, $p<0.000$) for the analysis of the sample size was found adequate for factor analysis.[14]

Content validity: Confirmatory principal component analysis with a varimax rotation and pair-wise exclusion was used to extract four components, as in the revised Icelandic version of the APS-POQ-R, based on 18 continuous variables in the APS-POQ-R-TR. The four components explained 60.1% of the variance in the data (Table 1). Component loadings were acceptable for all items.[14]

The first component was the largest, with nine variables, and explained 36.1% of the variance. Other components explained from 6.0% to 10.3% of the variance (Table 1). Component loadings were acceptable for all items (18) and exceeded 0.600 for all variables, except for the "Participation in pain treatment decisions" (0.446). Commonalities were >0.50 for all items, except for the "Participation in pain

Table 1. Initial component loadings and rotated matrix of the APS-POQ-R-TR

	Components			
	Pain Severity, Activity Interference, Sleep Interference	**Affective and Perceptions of Care**	**Adverse Effects**	**Pain severity and Adverse Effects**
Variance explained (Total scale: 60.1%)	36.1	10.3	7.7	6.0
No of items	9	5	3	2
Component loadings				
Least pain	0.624	-0.031	-0.101	0.408*
Worst pain	0.585	0.329	0.190	-0.029
Percentage of time spent in severe pain	0.676	0.148	0.061	0.076
Pain interference with activities in bed	0.653	0.224	0.337	-0.049
Pain interference with activities out of bed	0.700	0.139	0.260	-0.052
Pain interference with falling asleep	0.679	0.352	0.212	-0.172
Pain interference with staying asleep	0.714	0.347	0.225	-0.194
Pain causing anxiety	0.393	0.777	0.067	0.046
Pain causing depression	0.294	0.794	0.070	-0.017
Pain causing fear	0.203	0.814	0.128	0.131
Pain causing helplessness	0.187	0.855	0.067	0.160
Severity of nausea	0.113	0.194	0.733	-0.016
Severity of drowsiness	0.202	0.019	0.603	0.347
Severity of itching	0.039	0.153	0.201	0.770
Severity of dizziness	0.152	0.124	0.723	0.056
Pain relief %	0.674	0.101	0.093	0.282
Participation in pain treatment decisions	-0.080	0.446	0.271	-0.048
Satisfaction with pain treatment	0.649	0.045	-0.111	0.309

Kaiser–Meyer–Olkin measure of sampling adequacy: 0.857; Bartlett's test of sphericity: x2 (153) = 2109.9; $p < 0.0005$; Boldface indicates component loading of >0.400; *Least pain value is lower in this component. Extraction Method: Principal Component Analysis. Four components extracted.

treatment decisions" (0.28). The eigenvalues ranged from 1.07 to 6.50, and no item was found to be highly correlated.

Reliability: Tables 2 and 3 show the internal consistency and item–total correlations of the initial testing of the APS-POQ-R-TR. Cronbach's alpha for the total scale was 0.88, and item–total correlations of items in the total scale were >0.40 for all items. Of the four subscales, three had alpha values of >0.60, indicating an acceptable reliability.[14] For the remaining scale, alpha for items deleted was not shown because the scale contains only two items. All items had an item–total correlation of >0.20 in the total scale (Table 3).

Construction of the final scale and subscales of the APS-POQ-R-TR

Construction of the final scale and subscales of the APS-POQ-R-TR exploratory principal component analysis with a varimax rotation was run with 18 items, resulting in 3 subscales: (1) pain severity, activity interference, and sleep interference; (2) affective effect and satisfaction; and (3) adverse effects. The eigenvalues were >1 for the four components, and all items had component loadings of >0.500 on a subscale. Commonalities were >0.50 for all items except "participation in pain treatment decisions (0.28)." Cronbach's alpha was ≥0.60 for the total scale and all three subscales.

There is no defined standard value in the literature for the reliability of articles with a correlation coefficient. Although some of the researchers state that <0.30 should be suspected,[19] most researchers take 0.20 as the limit value.[21] In this study, the reliability scale is based on 0.20. All items had an item–total correlation of >0.20 in the total scale (Table 3). Table

Table 2. Initial Internal Consistency (Cronbach's alpha) of the APS-POQ-R-TR

Total scale	Cronbach's alpha if item deleted	Pain Severity, Activity Interference,Sleep Interference, Perceptions of Care and Satisfaction	Affective and Perceptions of Care	Adverse Effects
Least pain	0.882	0.854		
Worst pain	0.874	0.840		
Percentage of time spent in severe pain	0.877	0.841		
Pain interference with activities in bed	0.872	0.831		
Pain interference with activities out of bed	0.874	0.833		
Pain interference with falling asleep	0.870	0.826		
Pain interference with staying asleep	0.869	0.820		
Pain causing anxiety	0.868		0.782	
Pain causing depression	0.871		0.784	
Pain causing fear	0.872		0.781	
Pain causing helplessness	0.872		0.770	
Severity of nausea	0.881			0.474
Severity of drowsiness	0.882			0.492
Severity of itching	0.884			0.619
Severity of dizziness	0.881			0.458
Pain relief %	0.877	0.843		
Participation in pain treatment decisions	0.888		0.898	
Satisfaction with pain treatment	0.885	0.866		

Cronbach's alpha for Total Scale: 0.88; Cronbach's alpha for Pain Severity, Activity Interference, Sleep Interference, Perceptions of Care and Satisfaction: 0.86; Cronbach's alpha for Affective and Perceptions of Care: 0.84; Cronbach's alpha for Adverse Effects: 0.62.

Table 3. Initial Corrected Item-Total Correlations of the APS-POQ-R-TR Items

	Total scale	Pain Severity, Activity Interference,Sleep Interference, Perceptions of Care and Satisfaction	Affective and Perceptions of Care	Adverse Effects
Least pain	0.351	0.445		
Worst pain	0.604	0.597		
Percentage of time spent in severe pain	0.518	0.589		
Pain interference with activities in bed	0.641	0.666		
Pain interference with activities out of bed	0.582	0.657		
Pain interference with falling asleep	0.682	0.722		
Pain interference with staying asleep	0.708	0.762		
Pain causing anxiety	0.713		0.733	
Pain causing depression	0.648		0.728	
Pain causing fear	0.639		0.740	
Pain causing helplessness	0.633		0.781	
Severity of nausea	0.401			0.436
Severity of drowsiness	0.346			0.412
Severity of itching	0.243			0.217
Severity of dizziness	0.390			0.453
Pain relief %	0.520	0.566		
Participation in pain treatment decisions	0.261		0.291	
Satisfaction with pain treatment	0.411	0.489		

4 shows the final scale and subscales, component loadings, and Cronbach alpha values.

Descriptive statistics for the APS-POQ-R-TR

The mean (SD) worst pain severity was 7.6 (2.4) in the first 24 h, and least pain was 1.6 (1.7). The mean (SD) satisfaction with treatment was 9.2 (0.2). Non-pharmacological pain management was not encouraged by nurses or physicians for 199 patients (79.6%); however, 126 patients (50.4%) had used such methods. The most frequently used methods were distraction (n=59, 23.6%), deep breathing (n=51, 20.4%), and praying (n=42, 16.8%). Many patients used more than one method. No significant difference in the subscale scores were found, according to patient characteristics. The results from individual items of the APS-POQ-R-TR are presented in Table 5.

Correlations of factors of the scales

There was a moderate positive correlation between factors, and the highest correlation was detected between factors 1 and 2 (0.547) (p=0.000) (Table 6). For the BPI-TR scale, low positive correlation between two factors (Factor 1, r=0.236; Factor 3, r=0.267), and moderate positive correlation for factor 2 (r=0.406) (p=0.000) (Table 7).

Discussion

The APS-POQ-R was developed and used in surgical patients in the United States, Denmark, Chinese and Australia, and its validity and reliability analyses were completed.[12, 20] However, because this scale has not been used in Turkey until now, it was performed with surgical patients after the surgery and its validity–reliability analyses were performed. Our study showed that patients found the APS-POQ-R-TR to be acceptable.

The Turkish version contains three subscales different from the original questionnaire, supporting the construct validity of the instrument. The internal

Table 4. Final Component Loadings, Rotated Matrix, and Internal Consistency of the APS-POQ-R-TR

	Subscales		
	Pain Severity, Activity Interference, Sleep Interference, Perceptions of Care	**Affective**	**Adverse Effects**
Variance explained (total scale: 54.1%)	23.1	19.5	11.5
Cronbac'sh alpha (total scale: 0.88)	0.86	0.84	0.60
No of items	9	5	4
Component loadings			
Least pain	0.682	-0.049	0.016
Worst pain	0.551	0.362	0.199
Percentage of time spent in severe pain	0.669	0.171	0.101
Pain interference with activities in bed	0.608	0.266	0.340
Pain interference with activities out of bed	0.661	0.183	0.266
Pain interference with falling asleep	0.621	0.405	0.192
Pain interference with staying asleep	0.651	0.404	0.200
Pain causing anxiety	0.368	0.786	0.087
Pain causing depression	0.260	0.805	0.071
Pain causing fear	0.187	0.807	0.158
Pain causing helplessness	0.179	0.842	0.104
Severity of nausea	0.053	0.219	0.713
Severity of drowsiness	0.207	0.007	0.672
Severity of itching	0.132	0.076	0.369
Severity of dizziness	0.105	0.143	0.722
Pain relief %	0.697	0.103	0.177
Participation in pain treatment decisions	-0.117	0.452	0.248
Satisfaction with pain treatment	0.692	0.038	-0.015

Kaiser–Meyer–Olkin measure of sampling adequacy: 0.857; Bartlett's test of sphericity: x2 (153)=2109.9; p<0.0005; Boldface indicates component loading of >0.400.

consistency was acceptable for the total and the subscales. In our study, sampling adequacy (KMO Turkish=0.857) and sample size (Bartlett's test of sphericity <0.000) were found adequate for factor analysis.[14] The KMO measure of sampling adequacy was considered good in Botti et al.'s[20] study (KMO Danish=0.832, KMO Australian=0.865, and Bartlett's test of sphericity <0.001); Wang et al.'s[12] study (Chinese=0.732) and Zöega et al.'s[14] study, KMO Icelandic=0.727).

In our study, pain severity, activity interference, sleep interference, and perception-of-care components were in the same subscale of the scale that was similar to the Australian version.[20] In the American version,[8] pain severity and sleep interference were found in the same subscale, although activity interference and perception of care were found in another subscale, as in the Chinese version.[12]

In the Turkish version of the scale, as in the American[8] and Australian versions,[20] "Satisfaction with pain treatment" and "Perception of care" items were in the same subscale. However, in the Icelandic sample, satisfaction and perception of care were in different subscales.[20] In the Turkish version, "Satisfaction with pain treatment" was in the same subscale as the "Pain relief" component because the word "satisfaction" refers to pleasure in Turkish. Similarly, Zöega et al. reported that patient satisfaction referred not only to pain relief but also to meeting patients' expectations.[20] Further, several studies have shown that patients can be satisfied with their pain management, despite experiencing severe pain.[22, 23]

Table 5. Results from the APS-POQ-R-TR (n=250)

Items Used in Principal Component Analysis	**Mean**	**SD**
Least pain	1.6	1.7
Worst pain	7.6	2.4
Percentage of time spent in severe pain	5.0	2.3
Pain interference with activities in bed	5.8	3.0
Pain interference with activities out of bed	5.1	3.2
Pain interference with falling asleep	3.6	3.6
Pain interference with staying asleep	3.6	3.6
Pain causing anxiety	3.1	3.6
Pain causing depression	2.4	3.5
Pain causing fear	2.4	3.5
Pain causing helplessness	2.2	3.4
Severity of nausea	2.4	3.1
Severity of drowsiness	1.6	2.8
Severity of itching	0.5	1.7
Severity of dizziness	2.0	2.7
Pain relief %	2.7	2.3
Participation in pain treatment decisions	3.7	3.6
Satisfaction with pain treatment	9.2	0.2
Items Not Used in Principal Component Analysis	**n (Valid %)**	
Use of non-pharmacological methods	Yes 126 (50.4) *Distraction* 59 (23.6) *Deep Breathing* 51 (20.4) *Praying* 42 (16.8)	No 124 (49.6)
Nurse or doctor who encouraged use of non-pharmacological methods	Never 199 (79.6) Yes 37 (14.8)	Sometimes/often 51 (20.4) No 213 (85.2)
Information about pain treatment	Mean 8.5	Min-max 0-10
Information about pain treatment Usefulness of information about pain treatment (if information received)		

In the original version, feelings of helplessness were loaded on the pain severity and activity subscale instead of the affective subscale. Our study indicated that "Pain causing helplessness" was related to the affective subscale. This probably relates to the translation of the word because the meaning in Icelandic can be understood as needing physical help. However, removing the item from the scale did not result in a higher Cronbach's alpha value, and item–total correlations were found to be acceptable.

Despite some variations, the component structure was similar to the original (American) version.[8] In the American version, sleep interference was loaded on the same subscale as pain severity, whereas activity interference was included in another subscale. In the Turkish version, pain severity, activity and sleep interference, and perception-of-care items were loaded on the same subscale. It seems reasonable that both activity and sleep interference items should be loaded on the same factor as that in the BPI, from where the questions are derived.[24] Similar to the Australian version of the scale, pain severity and activity interference were on the same subscale.[20] However, in the Icelandic version of the scale, pain severity and sleep interference were on the same subscale, and activity interference was separated from them.[14] This is likely to be related to some cultural differences between the countries.

In addition, Cronbach's alpha value for the total scale

Table 6. Correlations of factors in the APS-POQ-R-TR (n=250)

Factors*	Factor 1	Factor 2	Factor 3
Factor 1			
Pearson correlation	1	0.547**	0.429**
Sig. (2-tailed)		0.000	0.000
Factor 2			
Pearson correlation	0.547**	1	0.526**
Sig. (2-tailed)	0.000		0.000
Factor 3			
Pearson correlation	0.429**	0.526**	1
Sig. (2-tailed)	0.000	0.000	

*Factors; 1: Pain severity, activity ınterference, sleep ınterference, 2: Affective and satisfaction; 3: Adverse effects; ** Correlation is significant at the 0.01 level (2-tailed).

Table 7. Correlations of factors in the Brief Pain Inventory (BPI-TR)

	Short Pain Inventory		
Factors*	Pearson Correlation	Sig. (2-tailed)	n
Factor 1	0.236	0.000	250
Factor 2	0.406	0.000	250
Factor 3	0.267	0.000	250
APS-POQ-R-TR total	0.362	0.000	250

*Factors; 1: Pain severity, activity ınterference, sleep ınterference; 2: Affective and satisfaction; 3: Adverse effects; **Correlation is significant at the 0.01 level (2-tailed).

was similar (0.88) to that of the American version (0.86). The internal consistency remained unchanged because we did not remove any of the items. In the initial testing, none of the items (Table 3) had low (<0.20) correlations with the total scale. In the exploratory analysis, only two items, "Severity of itching" and "Participation in pain treatment decisions," showed low item–total correlation (<0.30), which can be considered marginal. The questionnaire has been commonly used in parts, and the results are presented for individual items rather than for total or subscales.[14]

Although the affective scale was identical in the Turkish and American versions, "Participation in pain treatment decisions" was loaded on the affective subscale in the Turkish version. In the Zöega et al.'s[14] study, the low alpha for the perception-of-care scale was related to "Participation in treatment decisions" and "Pain relief" on the scale because the patients were unwilling to participate in the treatment decision. Similarly, in a Swedish study, some patients felt reluctant to participate in the treatment decisions.[25] Although the two items of the perception-of-care scale are conceptually related to the original scale, the items should rather be used individually instead of as a subscale due to the low reliability in the Icelandic version.[14] For Turkish and Danish patients, satisfaction was associated with the degree of pain severity and activity interference, whereas for Australian patients, satisfaction was associated with their perceived ability to participate in the treatment decisions.[20]

In our study, 50.4% of the patients used non-pharmacological methods, whereas only 20.4% of them reported that physicians or nurses encouraged the use of these methods. This finding is similar to the findings of Zöega et al.'s[8, 14] and Gordon et al.'s studies. In the first aforementioned study, only 27.7% of the patients were encouraged by the physicians or nurses, whereas 48.9% of the patients used these methods to treat their pain.[14] In the latter study, nearly 62% of the patients used the non-pharmacological methods.[8] Sociocultural factors also affect non-pharmacological pain management strategies. In the present study, we found that mostly distraction, deep breathing, and praying were used by the patients. Similarly, African–Americans reported a higher use of passive pain-coping strategies, distraction, and praying.[26] The Anglo American and Danish patients used distraction methods, whereas Chinese patients used external agents (salves, oils, massage, etc.).[27] In the Mexican culture, touching is used to treat pain without pharmacological agents.[28] Therefore, the healthcare provider must provide and apply appropriate coping skills to the patient.

Correlations of factors of the scales

The highest correlation in the intra-factorial correlation of the APS-POQ-R-TR scales was found between factors 1 and 2 (0.547) (p=0.000) (Table 6). For the BPI-TR scale, moderate positive correlation was detected for factor 2 (r=0.406) (p=0.000) (Table 7). Based on these results, the BPI-TR can be used as an alternative scale to the APS-POQ-R-TR scale.

Study limitations

Nonetheless, there are some limitations to the present study. Because our study population was gathered from a single center, the results cannot be

representative of the overall population of postoperative patients. In addition, the results can fall short of explaining some factors due to the cultural diversity between countries that may have reflected on the pain perception of patients. Another limitation is that some of the patients did not receive any assistance when filling out the questionnaire, and we were unable to recognize whether this affected the results.

Conclusion

The APS-POQ-R-TR exploratory principal component analysis with a varimax rotation was run with 18 items, resulting in 3 subscales: (1) pain severity, activity interference, sleep interference, and perception of care; (2) affective effect; and (3) adverse effects. Our study results confirm an acceptable reliability, validity, and cross-cultural adaptation of the APS-POQ-R-TR in a postoperative sample, which implies that global measurement of pain management quality in medical and surgical patients is reasonable. Furthermore, translated versions in several languages can facilitate the comparison of quality of pain management between the institutions and countries, thereby improving pain management.

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