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RESEARCH ARTICLE

Assessing Thirst Symptom of Patients Undergoing Abdominal Surgery: A Scale Development Study

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ABSTRACT

Aim: The aim of this study was to develop a postoperative thirst rating scale for patients undergoing major abdominal surgery.
Method: The study was carried out methodologically. Fifty four patients who underwent major abdominal surgery in the general surgery clinic were included in the study. The data of the study were collected between June 2019 and December 2020. In this study in sequence, scale items were created, assessed through expert opinion, tested in a sample of patients and data collected, validity and reliability of the scale were evaluated, and the results were analyzed.
Results: The Cronbach's alpha value of the scale was 0.957. Test and retest results to test the reliability of the scale were $p<0.001$ and $r=0.976$. Content and construct validity results, which were conducted to test the validity of the scale, showed that the scale was valid. The final scale consisted of six items with excellent reliability and validity. The final version of the scale had a potential minimum score of 0 and maximum score of 18, with higher scores indicating worse thirst. The mean thirst score was 13.03±2.92.
Conclusion: The scale developed to evaluate the thirst status of patients undergoing abdominal surgery is a valid and reliable scale, and its use is recommended.
Keywords: Abdominal surgery, postoperative, thirst, scale

Introduction

Thirst is a symptom defined as the desire to drink water.[1,2] Thirst is a subjective symptom. It is a problem that affects the patient physiologically, psychologically, socially and spiritually during the perioperative period.[1,3] Postoperative thirst is reported to affect from 43.8% to 75% of patients following surgery.[4,5] Robleda et al.[6] investigated the problems patients undergoing abdominal surgery experienced and reported that dry mouth was the most common, affecting 88% of their subjects.

Surgical patients are at high risk of thirst for many reasons. These include the preoperative fasting period when being prepared for surgery, preoperative nutritional status, preoperative examinations and bowel preparation for the surgical procedure, drugs used, intubation, blood loss, fluid-electrolyte imbalance, and neuroendocrine response to the stress caused by surgery.[1,4,7] Patients undergoing surgery are likely to develop both osmotic and hypovolemic thirst.[1] When anxiety, irritability, stress and fear regarding the postoperative process are also present, patients may experience the feeling of thirst much more intensely due to the activation of the sympathetic nervous system.[1,4,8]

Based on the literature and our clinical experience, it seems evident that patients experience very high rates of thirst and symptoms of dry mouth during the postoperative period. However, these symptom are still not evaluated by health professionals in a desirable way and are not included in nursing diagnosis systems, and very few methods are used to alleviate this situation.[9,10,11,12,13,14] There is no measurement tool in our country that health professionals can use to objectively measure the experiences of patients after surgery. The aim of this study, therefore was to develop a valid and reliable measurement scale to evaluate the sensation of thirst experienced by patients undergoing abdominal surgery in the postoperative period.

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Materials and Methods

The study was carried out methodologically. In scale studies, there should be a sample number between 5 and 30 for each item according to the number of scale items.[15] This study was completed with 54 patients. The data of the study were collected between June 2019 and December 2020. Patients undergoing major abdominal surgery in a general surgery service were invited to the study. Patients who agreed to participate in the study, who spoke Turkish, who had American Society of Anesthesiologists (ASA) Physical Status Score 1 and 2, and who underwent major abdominal surgery were included in the study. Exclusion criteria were patients with general condition disorders that might cause difficulty in communicating and patients with diagnoses, such as Sjögren's syndrome and xerostomia, that might affect their thirst status.

Developing the Scale

Formation of items: Face-to-face interviews were conducted with 11 patients who underwent abdominal surgery. Using a semi-structured form, the patients were asked, "What was your most disturbing complaint in the post-operative period? How would you describe your thirst complaint? In which parts of your body (tongue, throat, mouth, lips...) did you feel thirsty? How did thirst make you feel? What did you do when you felt thirsty? How did you express it?". Audio recordings of the interviews with the patients were collected. These recordings were independently listened and transcribed by two researchers. It was concluded that the patients felt dryness in their lips, tongue, palate and throat, they experienced saliva deficiency, they wanted to drink water, and their body temperature increased. Afterwards, studies on thirst were scanned[1,2,3,4,5,6,7,8,9,10,11,12,13,14,16] and nine scale items were created.

Pilot application: A pilot application was conducted with five patients.

Analysis: Reliability analysis and validity analysis of the scale were performed.

Validity analysis: Content, construct and criterion validities were performed for the validity analysis of the scale. In order to test the content validity of the scale items, expert opinions were obtained from eight faculty nurses and six general surgeons. DAVIS method was used for this evaluation. Experts evaluated each scale item according to the options "1: the item is appropriate, 2: the item should be slightly revised, 3: the item should be reviewed seriously, 4: the item is not appropriate". For the item analysis in the construct validity of the scale, firstly, mean and standard deviation values were calculated for each item. Then, whether there was a difference between the item averages was evaluated with the Friedman test. In addition, item-total correlation analyzes were performed. Items with a negative corrected item total correlation coefficient and items with coefficient below 0.30 were excluded from the scale.[17] Explanatory factor analysis and confirmatory factor analysis were used for the construct validity of the scale. Before the factor analysis, whether the sample size was sufficient or not was evaluated with the Kaiser Meyer-Olkin (KMO) test. A KMO value above 0.60 has been shown to indicate that the sample size is sufficient for factor analysis.[18] For criterion validity, a numerical scale numbered between 0 and 10 (0; I do not feel thirsty at all, 10; I feel very thirsty) was used to measure the degree of thirst.

Reliability analysis: Test-retest analysis was used for the reliability analysis of the scale. The scale was reapplied to the entire sample group with an interval of one hour. The purpose of applying it with only a one hour interval was to enable patients to respond independently of their previous answers and without any change in their thirst status. An evaluation was made by calculating the correlation coefficient between the two measurements.

Data Collection

Data collection was carried out in two stages. In the first stage, the patients were interviewed about their thirst experience using a semi-structured form. In the second stage, data were collected with the data collection form (date of birth, gender, height, weight, marital status, education level, ASA score, diagnosis, operation time) and thirst assessment scale created by the researchers.

Responses to scale items were scored as: none: 0; few: 1; moderate: 2; and much: 3. There was no reverse coded item in the scale. As the score obtained from the scale increased, the degree of thirst increased. The aim of the study was explained by face-to-face interviews with the patients before the surgery. Consent was obtained from the patients who agreed to participate in the study.

Ethical Approval

Ethics committee approval of the study was obtained (approval number: 19/10, date: 17.01.2019). The study was carried out on a voluntary basis. Verbal and written consent was obtained from the participants. Data were collected through face-to-face interviews with patients.

Statistical Analysis

SPSS for Windows, Version 21.00 (SPSS Inc. Chicago, IL, USA) statistical package program and IBM SPSS AMOS 24 statistical program were used for data analysis. Number, percentage, mean and standard deviation values were used for descriptive statistics. Exploratory factor analysis and confirmatory factor analysis were used for the validity analysis of the scale. For reliability analysis, Cronbach's

alpha coefficient and intraclass correlation coefficient were calculated.

Results

Sociodemographic Data

Sociodemographic data of the patients participating in the study are given in Table 1. For the whole cohort of 54 patients, 64.8% were male, all were married. In the educational status groupings, the largest group was "completed primary education" (42.6%). All but one of the patients (98.1%) had an ASA score of 2 and 64.8% of the patients underwent surgery for colorectal cancer. The mean age of the patients was 61.52±9.57 years, mean body mass index was 26.42±4.35, and the mean operation time was 188.80±74.50 minutes.

Table 1. Sociodemographic and clinical characteristics of the patients

Sociodemographic feature	n	%
Gender		
Women	19	35.20
Men	35	64.80
Marital status		
Married	54	100
Educational status		
Literate	7	13
Primary education	23	42.60
High school	20	37
University	4	7.40
ASA		
ASA1	1	1.90
ASA2	53	98.10
Diagnosis		
Colorectal Ca	35	64.81
Stomach Ca	9	16.66
Esophageal Ca	1	1.85
Pancreatic Ca	4	7.40
Diverticulitis perforation	1	1.85
Liver giant hydatid cyst	1	1.85
Intra-abdominal mass	2	3.70
Small intestine perforation	1	1.85
	Min.-Max.	**Mean ± SD**
Age	42-88	61.52±9.57
BMI	15.79-36.75	26.42±4.35
Operation time	85-465	188.80±74.50

ASA: American Society of Anesthesiologists, Ca: Cancer, SD: Standard deviation, Min.: Minimum, Max.: Maximum, BMI: Body mass index

Data of the Scale

Formation of the items: As a result of the pilot interviews and the literature review, nine items related to thirst were developed.

Validity analysis: For the content validity of the scale, the scale items submitted to expert opinions were evaluated with the DAVIS method. As a result, the scores obtained for each item were summed and divided by the number of experts[14] and eight items with a content validity ratio above 0.80 (content validity ratios were 1, 1, 1, 0.5, 1, 1, 0.85, 0.85, and 0.92, respectively) were identified. In order to determine the degree to which the items could measure the desired target factors related to thirst, mean and standard deviation values of each item and item total correlation analyzes were performed. The difference between the item averages was evaluated with the Friedman test and two items (with means of 0.67 and 0.65) were removed from the scale. In the corrected item-total correlation analysis performed subsequently, there was no item with a negative coefficient or coefficient below 0.30. The corrected item-total score correlation coefficients of the items were found to be between 0.668 and 0.973 (Table 2). The Kaiser-Meyer-Olkin test result, in which the sample size was evaluated for exploratory factor analysis, was 0.902 indicating a sufficient sample size (Bartlett's test of sphericity X^2=429.427, p<0.001). According to the results of the exploratory factor analysis, the scale items were grouped under a single factor. Factor loads of items were: item 1: 0.748; item 2: 0.983; item 3: 0.925; item 4: 0.962; item 5: 0.947; and item 6: 0.866.

The confirmatory factor analysis results showed that the scale was within the perfect fit criteria (Figure 1 and Table 3). Goodness of fit indices of the scale were as follows; goodness of fit index (GFI): 0.992; adjusted (A)GFI: 0.981; comparative fit index: 1,000; normed fit index: 0.997; root mean square error of approximation: 0.001; and RMR: 0.002.

The mean score of the numerical scale used for criterion validity was 6.70±1.17 (range: 5-9). A statistically significant and positive strong correlation was found between the thirst total scale score and the numerical scale total scale score (r=0.828, p<0.001).

Reliability analysis: The total mean score of the thirst scale was 13.03±2.92 (range: 7-18), and the mean retest score was 13.13±2.68 (range: 8-18). The intra-class correlation coefficient between the total mean score of the scale and the mean score of the retest was 0.976 (p<0.001). The internal consistency coefficient of the scale was 0.957.

Table 2. Item analysis results.

Item	Mean	Standard deviation	Scale mean after the item was deleted	Scale variance when the item was deleted	Corrected item-total score correlation	Cronbach alpha value when the item was deleted
1. I feel dry on my lips because of my thirst	2.35	0.482	10.69	6.635	0.668	0.969
2. I feel dry on my tongue because of my thirst	2.13	0.551	10.91	5.671	0.973	0.937
3. I feel dry on my palate because of my thirst	2.07	0.544	10.96	5.885	0.888	0.947
4. I feel dry in my throat because of my thirst	2.15	0.563	10.89	5.686	0.940	0.941
5. I feel that my saliva is insufficient	2.09	0.559	10.94	5.752	0.919	0.943
6. I want to drink a lot of water to quench my thirst	2.24	0.512	10.80	6.203	0.809	0.955

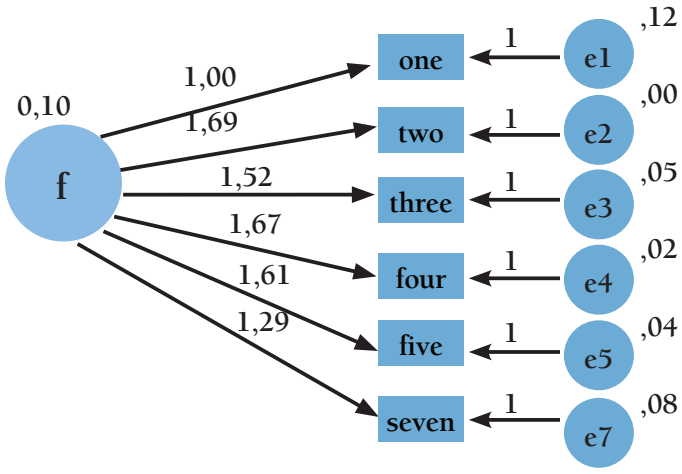

Figure 1. Result of confirmatory factor analysis

Table 3. Goodness of fit indices of the scale

Fit indices	Thirst scale	Perfect fit criteria	Acceptable fit criteria
Chi-square	1.359	-	-
Degree of freedom	9	-	-
RMSEA	0.001 (p<0.05)	0≤ RMSEA ≤0.05	0.05≤ RMSA ≤0.08
CFI	1.000	0.90≤ CFI ≤1.00	0.80≤ CFI ≤0.90
NFI	0.997	≥0.90	≥0.80
GFI	0.992	≥0.90	≥0.80
AGFI	0.981	0.95≤ AGFI ≤1.00	0.80≤ AGFI ≤0.95

RMSEA: Root Mean Square Error of Approximation, CFI: Comparative fit index, NFI: Normed fit index, GFI: Goodness of fit index, AGFI: Adjusted goodnes of fit index

The final version of the scale developed to evaluate the thirst levels of patients who underwent abdominal surgery was a single factor scale consisting of six items. Each item was scored from 0 (none) to 3 (much). Therefore the minimum and maximum possible scores from the scale were 0 and 18, respectively. As the score obtained from the scale increased, the severity of thirst increased.

Discussion

Thirst is a symptom that patients often experience. Restricting oral intake for reasons such as bowel preparation and anastomosis safety, especially in patients undergoing abdominal surgery, increases the likelihood of patient post-operative thirst. Scales related to thirst have been developed for hemodialysis patients, patients with heart failure and surgical patients.[1,2,16] No scale was found in our country to evaluate the thirst symptoms experienced by patients who underwent abdominal surgery. It is important to evaluate these symptoms that occur in a high proportion of patients, and especially in those who have undergone major abdominal surgery, to make the post-operative experience as easy as possible and also to evaluate the effectiveness of any intervention. The study conducted for this purpose was a methodological study in which a tool was developed to evaluate the symptoms of thirst experienced by the patients and the validity-reliability of the scale was evaluated. The thirst scale developed according to the results obtained was shown to be a valid and reliable scale.

Scale validity is a criterion that shows how accurately the item to be measured with the scale is measured. For this purpose, content validity was first performed and the DAVIS technique was used. The number of experts should be between 3-40 in order to evaluate the content validity.[17,19,20,21] In the present study, 14 experts were consulted. Similarly,

the content validity index (CVI) result for each item should be 0.80 or above.[17,19,20,21] In this study, it was observed that the CVI of the items ranged from 0.5 to 1. One item with an CVI <0.8 was removed from the scale, leaving eight of the original nine items for evaluation. Whether there is a difference between the averages of the items needs to be evaluated statistically.[17] Two items with a lower average than the other items were excluded from the scale. In addition, mean and standard deviation values of each item were calculated and item-total correlation analyzes was performed. It is accepted items with a negative corrected item-total correlation coefficient and items with coefficient below 0.30 can be excluded.[22] In this study, no items were removed from the scale at this stage, since there was no item below this value.

The fact that the scale items are compatible with each other and in a similarly homogeneous structure is a feature that shows the construct validity of the scale. The analyzes made for this purpose are factor analysis including exploratory and confirmatory factor analyzes.[17] The adequacy of the sample size should be evaluated before the exploratory factor analysis.[17,23] A KMO value above 0.6 is the accepted value for sample adequacy.[18,19,20,21,22,23,24] In this study this value was above the accepted limit, it showed that the sample size was sufficient. Exploratory factor analysis is an analysis method in which the factor structure in the data is determined with the help of observed variables.[17] According to the results of the exploratory factor analysis conducted in this study, the scale items were grouped under one factor. Furthermore, items with factor loads above 0.30 can remain in the scale.[22] All the factor loads of the remaining six items were above 0.30. Confirmatory factor analysis is a method to assess the theoretical structure determined by the researcher using the data obtsained.[17] In the present study the confirmatory factor analysis fitted the criteria for a perfect fit (Figure 1, Table 3). It was confirmed that the scale items were collected in a single factor.

The test-retest method is a method used for the reliability analysis of the developed scale and evaluating variability over time.[17] It is recommended to apply the test-retest method 2 to 6 weeks after the initial evaluation.[18,25] However, thirst symptoms can rapidly change in the postoperative period. Therefore, test was repeated only one hour after the first evaluation, as subjective thirst may have changed. This was an attempt to ensure that the patients responded independently of their previous evaluations and that they responded without any change in thirst symptoms. The test-retest correlation coefficient was 0.976 ($p<0.001$). A correlation number close to 1 indicates high reliability.[17,25] This result over a normal test-retest time-scale would indicate excellent test-retest reliability but as the delay between test and retest was only one hour, this result may be somewhat unreliable.

The closer the Cronbach's alpha coefficient is to 1, the more reliable the scale is.[17,25] In this study, the internal consistency coefficient of the thirst scale was found to be 0.957. This result showed that the thirst scale was a reliable scale.

Study Limitations

Conducting the study in a single center was a limitation of the study. Another limitation was the use of a non-valid and unreliable numerical scale in the assessment of thirst for criterion validity.

Conclusion

According to the results of this study, the thirst scale, which was developed to evaluate thirst symptoms experienced in the postoperative period in patients who underwent major abdominal surgery, was a valid and reliable measurement tool. It is recommended to use the thirst scale in the evaluation of thirst symptoms experienced by patients who have undergone abdominal surgery in the early postoperative period.

Ethic

Ethics Committee Approval: Ethics committee approval of the study was obtained (approval number: 19/10, date: 17.01.2019).

Informed Consent: Verbal and written consent was obtained from the participants.

Peer-review: Externally peer-reviewed.

Author Contributions

Surgical and Medical Practices: M.Ö., Ü.A., Concept: B.Ö., S.Y.Ş., E.İ., Design: B.Ö., S.Y.Ş., E.İ., M.Ö., Ü.A., Data Collection and/or Processing: M.Ö., Ü.A., Analysis and/or Interpretation: B.Ö., S.Y.Ş., Literature Search: B.Ö., S.Y.Ş., E.İ., M.Ö., Ü.A., Writing: B.Ö., S.Y.Ş., E.İ., M.Ö., Ü.A.

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