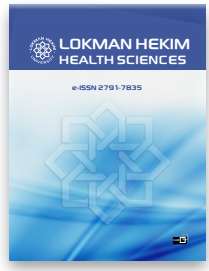
LOKMAN HEKIM HEALTH SCIENCES

DOI: 10.14744/lhhs.2025.49607
Lokman Hekim Health Sci 2025;5(3):305–311



lokmanhekimhs.com

ORIGINAL ARTICLE

The Relationship Between Preprocedure Anxiety Level and Postprocedure Abdominal Pain and Distention in Patients Undergoing Colonoscopy: A Descriptive Study

Kolonoskopi Uygulanan Hastalarda Işlem Öncesi Kaygı Düzeyi ile Işlem Sonrası Abdominal Ağrı ve Distansiyon Arasındaki Ilişkisi: Tanımlayıcı Bir Çalışma

Gülden Küçükakça Çelik[1], Kenan Gümüş[2], Seçil Taylan[3], Fadime Ertural[4]

[1]Department of Nursing, Nevşehir Hacı Bektaş Veli University, Semra and Vefa Küçük Faculty of Health Sciences, Nevşehir, Türkiye
[2]Department of Nursing, Amasya University Faculty of Health Sciences, Amasya, Türkiye
[3]Department of Nursing, Akdeniz University Kumluca Faculty of Health Sciences, Antalya, Türkiye
[4]Nuh Nacı Yazgan University Vocational School, Kayseri, Türkiye

Abstract

Introduction: Colonoscopy is perceived by patients as a painful and anxiety-inducing invasive procedure. Anxiety can negatively affect patient comfort by causing unwanted symptoms such as pain and abdominal distension.

Methods: The study was conducted in the patients undergoing first-time colonoscopy. Data were collected before and 0, 30 minutes, 1, and 2 hours after the colonoscopy procedure. Anxiety was measured using the State Anxiety Inventory (STAI), and abdominal pain and distension were measured using the Visual Analog Scale (VAS). Data were analyzed using descriptive statistics, one-way analysis of variance in repeated measures, and Pearson correlation analysis.

Results: The study included 164 patients. The mean age of the patients was 54.15±15.14 years, and the mean STAI score before colonoscopy was 41.97±10.34. The highest mean pain and distension severity scores were found 30 minutes after colonoscopy (pain: 2.7744±2.27369; distension: 2.8720±2.14263). There was a significant positive correlation between the mean scores of the STAI and the mean scores of all abdominal distension interview times. Pain before colonoscopy resulted in an increase in distension complaints after the procedure. Increased distension both before and after the procedure was an important factor in the increase in pain intensity ($p<0.05$).

Discussion and Conclusion: The results of this study showed that patients' anxiety level before the colonoscopy procedure resulted in an increase in the severity of abdominal distension after the procedure. Abdominal distension led to increased pain, and high pain levels were also associated with distension. Healthcare professionals should be aware of patients' anxiety prior to colonoscopy in the management of adverse symptoms experienced by patients.

Keywords: Colonoscopy; Anxiety; Pain; Abdominal distension; Nursing

This study was presented as an oral presentation at the Çukurova Gastro-Intestinal Diseases and Surgery Congress on 21–24 September 2023.

Cite this article as: *Küçükakça Çelik G, Gümüş K, Taylan S, Ertural F. The Relationship Between Preprocedure Anxiety Level and Postprocedure Abdominal Pain and Distention in Patients Undergoing Colonoscopy: A Descriptive Study. Lokman Hekim Health Sci 2025;5(3):305–311.*

Correspondence: Gülden Küçükakça Çelik, M.D. Nevşehir Hacı Bektaş Veli Üniversitesi, Semra ve Vefa Küçük Sağlık Bilimleri Fakültesi, Hemşirelik Bölümü, Nevşehir, Türkiye
E-mail: guldenkucukakca@hotmail.com **Submitted:** 15.05.2025 **Revised:** 22.06.2025 **Accepted:** 20.08.2025

Colonoscopy is a medical procedure that uses a long, flexible, fiber-optic instrument to examine the colon, take a biopsy, or remove precancerous lesions. Colonoscopy takes an average of 30 minutes and can be performed under conscious sedation.[1] Although complications associated with colonoscopy are rare,[2] patients perceive it as a highly invasive procedure. Patients often find colonoscopy uncomfortable, painful, and anxiety-provoking.[3,4] The causes of anxiety are reported to be related to the procedure preparation, procedure pain, embarrassment and, to a higher degree, to the fear of getting cancer.[5]

The most important factor affecting the success of a colonoscopy is pre-procedure anxiety. Anxiety can lead to adverse events such as prolonging the colonoscopy procedure, increasing the patient's pain and need for sedation related to the procedure.[4] People with high levels of anxiety have been reported to have increased symptoms following a colonoscopy.[1,6] The most common of these symptoms are abdominal pain and bloating caused by air being introduced into the bowel during the procedure.[7,8]

Many articles in the literature state that patients experience anxiety[9,10] and report that it can be controlled with various methods applied.[7,8,11] It is also reported that excessive external pressure applied to the abdomen during the procedure may cause pain and bloating[12] and that these symptoms will be frequently seen in the first two days after the procedure.[13] However, studies evaluating patient experiences report that there is no difference in these symptoms after the procedure compared to the colonoscopy procedure,[14] while some studies indicate that patients may experience bloating, pain and changes in bowel habits after colonoscopy.[15] A systematic review indicates that these symptoms will vary depending on patient characteristics.[16] It is stated that anxiety may cause an increase in these symptoms and negatively affect the success of the procedure.[17] In addition, it is emphasized that postprocedural pain, distension, and many other unwanted symptoms can be reduced with the methods applied.[7,8,11,13,18] No study has examined the relationship between anxiety and abdominal pain and distension in patients undergoing colonoscopy and the time period after the procedure and the magnitude of this relationship. Therefore, this study, which was conducted to determine the relationship between anxiety and abdominal pain and distention in patients undergoing colonoscopy, is original.

Materials and Methods

Study Place and Design

This study was carried out at the endoscopy unit of a Nevşehir Public Hospital and designed as a descriptive type of research to determine the relationship between preprocedural anxiety level and postprocedural abdominal distension and pain in patients undergoing colonoscopy.

Purpose and Type of the Study

This study was conducted as a descriptive type of research to determine the relationship between preprocedural anxiety level and postprocedural abdominal distension and pain in patients undergoing colonoscopy.

Sample of the Study

This study was conducted in the endoscopy-colonoscopy unit of Nevsehir state hospital. Before starting the study, the sample size was calculated using G*Power software (version 3.1.9.4) based on a One-Way Repeated Measures ANOVA with $\alpha = 0.050$, power $(1-\beta) = 0.950$, and an effect size of $f = 0.250$ (medium). The sample size was determined to be 141 patients with a confidence interval of 95% and a margin of error of 5%. Between August 2022 and January 2023, 222 patients were achieved. Each patient was included in the study after being assessed according to the inclusion criteria. The sample consisted of 164 the patients who underwent their first and only colonoscopy, agreed to participate in the study, were over 18 years of age and able to communicate were recorded for the study. The patients who had previously undergone colonoscopy, had a psychiatric and neurological medical diagnosis, developed a complication requiring intervention due to the procedure, had abnormal changes in vital signs during the colonoscopy process, and did not volunteer to participate in the study were excluded.

Data Collection Tools

Patient Descriptive Characteristics Form

Descriptive Characteristics Form is a form prepared by the researcher to determine the socio-demographic and medical history of the patients.[7,8,11,19]

State Anxiety Inventory (STAI)

The scale, adapted to the Turkish population by Öner and LeCompte,[19] which was developed by Spielberger et al.[20] and, requires individuals to express how they feel at a certain moment and under certain conditions and

to give answers by considering their feelings about their current situation. STAI form is a 4-point Likert scale that evaluates the anxiety levels of patients with 20 questions. In the sections to be marked on the scale, there are "not at all", "a little", "a lot", "completely" options to determine the intensity of behaviors and emotions. The total score value obtained from the scale varies between 20-80. High scores indicate high anxiety, and low scores indicate low anxiety level. In this study, the Cronbach's alpha value of the scale: 0.874.

Visual Analog Scale (VAS)

The scale developed by Cline et al.[21] consists of a 10 cm horizontal line to assess the severity of abdominal pain and bloating after colonoscopy.[22] The value of the scale is determined by measuring the distance between the left end of the scale and the marked point and varies between 0 and 10. Higher scores indicate more severe symptoms.

Data Collection

All patients received standard care and bowel preparation 3 days before the procedure according to hospital procedures before colonoscopy (a liquid diet with a bowel cleansing agent- monobasic/dibasic sodium phosphate and sennoside A+B Calcium - the evening before the study). One hour before performing the colonoscopy procedure, the researcher invited the patients to participate in the study. Patients who accepted the study were interviewed and a descriptive characteristics form, and state anxiety inventory were administered before the procedure. On the morning of colonoscopy, all patients were transferred to the colonoscopy procedure room to obtain written informed consent for the procedure and to make the necessary preparations for conscious sedation. Afterwards, all patients were given a minimal dose of sedative (Propofol) and anticholinergic (hyoscine-N-butylbromide) according to their weight. All examinations were performed by a qualified gastroenterologist/general surgeon using a colonoscope with similar specifications. After the procedure was completed, the severity of pain and abdominal distension experienced at 0, 30 minutes, 1 and 2 hours were assessed by VAS and data collection was completed. Post-procedure data collection times were decided by taking into consideration the patients' highest abdominal pain and distension times in a study.[8] Approximately 60–70 minutes was allocated for the data collection process. The face-to-face interview method was used for data collection. The procedures were generally conducted between 08:00 and 15:00.

Statistical Analysis

Data were evaluated using SPSS 23.0 software (SPSS Inc., Chicago, Illinois). The normal distribution of the data was assessed according to Shao's kurtosis and skewness criteria and the results of the Kolmogorov–Smirnov test. The analyses indicated that the data were normally distributed; therefore, parametric tests were used. Categorical changes were shown by frequency distribution. Descriptive statistics were used for numerical variables. Differences between measurements were assessed by One-Way Repeated Measures ANOVA. Post-hoc pairwise comparisons were conducted using the Tukey test, which revealed significant differences between multiple time points in STAI, pain, and distention scores. For example, pain scores increased significantly from before colonoscopy to 30 minutes after the procedure and then decreased at 2 hours post-procedure; distention scores showed a similar pattern. Finally, the relationship between symptoms was assessed by Pearson correlation analysis, as the variables were continuous and normally distributed. The value of statistical significance was accepted as $p<0.05$.

Ethical Aspects of the Study

This study was conducted in the endoscopy department of a public hospital. Prior to the study, ethical approval was obtained from the non-interventional ethics committee of a university (date: 20.06.2022, decision no: 2022/67) and permission was obtained from the hospital where the study would be conducted (date: 10.08.2022, decision no: E-26171210-929). Before the procedure, all patients were informed about the study, and their written and verbal consents were obtained. The entire process of the study was carried out in accordance with the principles of the Declaration of Helsinki.

Results

Two hundred twenty-two patients were recorded to the study. Of those, 58 patients were excluded because of previously undergone colonoscopy, had a psychiatric and neurological diseases, and not to be volunteer to participate. The study was carried out with 164 patients.

When the distribution of patients was analyzed according to their sociodemographic characteristics (Table 1), it was found that the mean age was 54.150±15.140 years, 52.400% were female, 82.900% were married, 21.300% were high school graduates, and 57.300% had income equal to expenses. 50.600% of the patients had a chronic disease and 64.000% had a history of abdominal surgery. The duration of the colonoscopy procedure was 10–19 minutes in the majority of patients (59.800%).

Table 1. Distribution of descriptive characteristics of the patients

	n	%
Age, 54.15±15.14 (20–88)		
20–39 age	26	15.900
40–59 age	75	4.700
60 age and above	63	38.400
Gender		
Female	86	52.400
Male	78	47.600
Marital status		
Married	136	82.900
Single	28	17.100
Education status		
Illiterate	18	11.000
Literate	9	5.500
Primary school	69	4.100
High school	35	21.300
Undergraduate and above	33	20.100
Profession		
Worker	28	17.100
Officer	32	19.500
Retired	44	26.800
Housewife	49	29.900
Not working	11	6.700
Income		
Income less than expenditure	58	35.400
Income equal to expenditure	94	57.300
Income more than expenditure	12	7.300
Presence of chronic disease		
Yes	83	50.600
No	81	49.400
Medication used		
Yes	81	49.400
No	83	50.600
Fear		
Yes	64	39.000
No	100	61.000
Abdominal surgery		
Yes	59	36.000
No	105	64.000
Duration of colonoscopy 14.55±6.10 (7–35) minute		
9 minutes and under	28	17.100
10–19 minutes	98	59.800
20–29 minutes	34	20.700
30 minutes and above	4	2.400

Table 2. Distribution of patients' pain and distension severity between measurements and state anxiety inventory before colonoscopy

Measurements	Mean±SD
STAI	
Before colonoscopy	41.970±10.340
Pain	
Before colonoscopy	1.475±1.871
Immediately after colonoscopy	1.945±2.188
30 minutes after colonoscopy	2.7744±2.274
1 hour after colonoscopy	2.3415±2.123
2 hours after colonoscopy	2.0671±2.064
F (4. 652)	22.923
p	**p<0.001**
Distention	
Before colonoscopy	1.0183±2.191
Immediately after colonoscopy	2.3171±2.288
30 minutes after colonoscopy	2.8720±2.142
1 hour after colonoscopy	2.6220±1.877
2 hours after colonoscopy	2.2988±1.811
F (4.652)	41.464
p	**p<0.001**

One-way repeated measures ANOVA (analysis of variance). STAI: State Anxiety Inventory; SD: Standard deviation.

Analyzing the mean scores of abdominal pain and distension severity between measurements using the STAI (Table 2), it was found that the mean STAI score before colonoscopy was 41.970±10.340. Patients had the highest pain and bloating severity at the third measurement (pain 30 minutes after colonoscopy: 2.774±2.274; bloating 2.872±2.143). One-Way Repeated Measures ANOVA revealed that the differences between the measurements were statistically significant ($p<0.05$). Tukey post-hoc analysis showed that pain scores at 30 minutes after colonoscopy were significantly higher than before colonoscopy and at 2 hours after colonoscopy ($p<0.05$). Similarly, distension scores at 30 minutes after colonoscopy were significantly higher than before colonoscopy and at 2 hours after colonoscopy ($p<0.05$). One-way repeated measures ANOVA revealed that the differences between the measurements were statistically significant for pain ($F(4. 652)=22.923$, $p<0.001$) and distension ($F(4. 652)=41.464$, $p<0.001$).

When the relationship between the mean scores of pain and distension severity between measurements and the STAI was analyzed (Table 3), it was determined that there was a significant positive correlation

Table 3. The relationship between the mean scores on the state anxiety inventory before colonoscopy and the mean scores of pain and distension severity between measurements

Measurements	STAI	Distention			
	Before colonoscopy	Before colonoscopy	Immediately after colonoscopy	30 minutes after colonoscopy	1 hour after colonoscopy	2 hours after colonoscopy
STAI						
Before colonoscopy						
r		**0.351**	**0.283**	**0.252**	**0.443**	**0.199**
p		**p<0.001**	**0.003**	**0.008**	**p<0.001**	**0.049**
Pain						
Before colonoscopy						
r	0.125	0.106	**0.227**	**0.350**	**0.198**	**0.230**
p	0.193	0.271	**0.017**	**p<0.001**	**0.038**	**0.016**
Immediately after colonoscopy						
r	0.064	**0.318**	**0.524**	**0.396**	**0.222**	**0.265**
p	0.504	**0.001**	**p<0.001**	**p<0.001**	**0.020**	**0.005**
30 minutes after colonoscopy						
r	0.172	**0.263**	**0.343**	**0.513**	**0.323**	**0.372**
p	0.073	**0.005**	**p<0.001**	**p<0.001**	**p<0.001**	**p<0.001**
1 hour after colonoscopy						
r	0.137	**0.209**	0.303	**0.416**	**0.393**	**0.350**
p	0.153	**0.028**	**0.001**	**p<0.001**	**p<0.001**	**p<0.001**
2 hours after colonoscopy						
r	0.089	**0.318**	0.388	**0.482**	**0.386**	**0.495**
p	0.357	**0.001**	**p<0.001**	**p<0.001**	**p<0.001**	**p<0.001**

Pearson correlation. STAI: State Anxiety Inventory.

between the mean scores of the STAI and the mean scores of all abdominal distension measurements, but there was no statistically significant relationship between the mean scores of pain severity. There was a significant positive correlation between pain before the colonoscopy procedure and distension severity scores after the procedure. There was also a significant positive correlation between the mean abdominal distension severity scores of the patients before and after the colonoscopy procedure and the mean pain intensity scores after the procedure ($p<0.05$).

Discussion

The results of this study show that patients with moderate pre-procedure anxiety experienced the highest abdominal pain and distension complaints after colonoscopy at the 30th minute. It was also determined that pre-procedure anxiety may have a significant negative effect on abdominal distension, especially for the first two hours after the procedure.

Although colonoscopy has diagnostic or therapeutic benefits, it is uncomfortable and stressful for many patients. It is considered natural for patients to experience the human emotion of anxiety when exposed to procedures such as a colonoscopy.[5] In fact, the results of this study show that patients experience a moderate level of anxiety prior to colonoscopy. Causes of anxiety related to colonoscopy in the literature include bowel preparation, procedure-related difficulties (sedation, feeling embarrassed, possibility of developing complications, and experiencing pain), concerns about the diagnosis, and fear of being diagnosed with cancer.[7,23,24] Shafer et al.[5] found that patients generally experience a moderate level of anxiety regarding colonoscopy and its outcomes. However, 18% of patients reported high anxiety about bowel preparation, 29% about the procedure itself, and 28% about various aspects of colonoscopy. It is stated that emotional factors such as embarrassment, anxiety, and fear experienced by patients due to the colonoscopy procedure may be associated with increased pain and distension.[7,8,13]

Due to the nature of the colonoscopy procedure, the introduction of air or carbon dioxide into the intestine and the sharp turns made with the colonoscope during the procedure can cause pain. Additionally, patients may experience distension after the colonoscopy.[7] These research findings have also shown that patients complain of pain and distension after the procedure, with these complaints being more severe, especially at the 30th minute post-procedure. Similarly, in the study by Tanrıverdi and Parlar Kılıç,[8] abdominal pain was highest at the 30th minute after the procedure, while complaints of abdominal distension were more prominent immediately after the procedure. The literature reports that 10% of patients may experience moderate to severe pain, such as abdominal pain, bloating, nausea, and abdominal cramping, due to the colonoscopy procedure. However, 34% of patients report that symptoms such as abdominal bloating, pain, and bowel dysfunction persist after the procedure. It is also reported that symptoms such as distension, abdominal pain, and changes in bowel function may persist after the procedure in 34% of patients.[25] Cheng et al.[6] stated that gas formation in patients is associated with anxiety and that anxiety can increase the frequency of bowel movements, leading to more bubbles in the intestines. They also reported that anxiety is an independent risk factor for bowel air bubbles in colonoscopy diagnosis. Indeed, another finding of this study confirms this situation, showing that while anxiety does not have a significant effect on pain, it is closely related to increased distension. Abdominal distension, in turn, leads to increased pain, and high pain levels are also associated with distension, potentially creating a "vicious cycle" where these factors influence each other. A separate study reported that anxiety triggers symptoms such as pain and nausea and that measures taken to reduce anxiety can improve patients' tolerance to colonoscopy.[26] Tanrıverdi and Parlar Kılıç (2023)[8] found that nursing interventions aimed at anxiety management, such as progressive relaxation exercises, may have a positive effect on reducing patients' complaints of abdominal pain and distension. It is also reported that controlling post-colonoscopy abdominal pain and distension is crucial for providing patient comfort, improving quality of life, and shortening the time required to return to daily activities.[7] Therefore, healthcare professionals should be aware that patient anxiety before the procedure may have an effect on symptoms such as abdominal distension and pain, which negatively affect patient comfort, especially up to two hours after the colonoscopy procedure. Accordingly, they should evaluate patient anxiety along with other symptoms before the procedure and provide the necessary management in line with evidence-based practices.

Strengths and Limitations of the Study

One of the main strengths of this study is that it is the first to demonstrate the impact of pre-colonoscopy anxiety on post-procedural abdominal distension, which affects patient comfort. Another key strength is the study's ability to determine the specific time frame and intensity at which patient anxiety influences post-procedural pain and distension. Additionally, the identification of abdominal distension and pain as interrelated factors potentially creating a "vicious cycle" further reinforces the study's significance. However, certain limitations should be acknowledged. First, considering the impact of a surgeon's skill on procedural success, the inclusion of participants who underwent colonoscopy performed by multiple surgeons, rather than a single surgeon, presents a limitation. Other limitations of the study include the fact that the data were collected in a single center and different doses of sedation were applied because the weights of the patients were not standard. Furthermore, the study results reflect general state anxiety in patients. Lastly, these findings are generalizable only to the patient population of the hospital where the data were collected.

Conclusion

This study aimed to determine the relationship between pre-procedural anxiety levels and post-procedural abdominal pain and distension in patients undergoing colonoscopy. The findings revealed that patients experienced a moderate level of anxiety before the procedure. Pre-procedural anxiety was particularly influential on abdominal distension. Additionally, increased distension contributed to greater pain severity, while higher pain levels further exacerbated distension, highlighting their interrelated nature. The results emphasize the importance of addressing not only pre-procedural anxiety but also pain and distension complaints to effectively reduce post-procedural pain and abdominal distension severity in patients.

Ethics Committee Approval: The Nevşehir Hacı Bektaş Veli University Non-Interventional Clinical Research Ethics Committee granted approval for this study (date: 20.06.2022, number: 2022/67).

Informed Consent: Written informed consent was obtained from participants.

Conflict of Interest: None declared.

Financial Disclosure: The authors declared that this study received no financial support.

Use of AI for Writing Assistance: Artificial intelligence-supported technologies were not used in this study.

Authorship Contributions: Concept: GKÇ, KG, ST, FE; Design: GKÇ, KG, ST, FE; Supervision: GKÇ, ST, KG; Resource: GKÇ, ST, KG; Materials: GKÇ, FE; Data Collection or Processing: GKÇ, ST, FE; Analysis or Interpretation: ST, KG; Literature Search: GKÇ, KG, ST, FE; Writing: GKÇ, ST, KG; Critical Reviews: GKÇ, KG, ST, FE.

Peer-review: Double blind peer-reviewed.

References

1. Pontone S, Lauriola M, Palma R, Panetta C, Tomai M, Baker R. Do difficulties in emotional processing predict procedure pain and shape the patient's colonoscopy experience? BMJ Open 2022;12:e050544. [CrossRef]
2. Steffenssen MW, Al-Najami I, Baatrup G. Patient-reported minor adverse events after colonoscopy: a systematic review. Acta Oncol 2019; 58:22-8. [CrossRef]
3. Trevisani L, Zelante A, Sartori S. Colonoscopy, pain and fears: Is it an indissoluble trinomial? World J Gastrointest Endosc 2014;6(6):227-33. [CrossRef]
4. Sargın M, Uluer M. The effect of pre-procedure anxiety on sedative requirements for sedation during upper gastrointestinal endoscopy. Turk J Surg 2020;36:368-73. [CrossRef]
5. Shafer LA, Walker JR, Waldman C, Yang C, Michaud V, Bernstein CN, et al. Factors associated with anxiety about colonoscopy: the preparation, the procedure, and the anticipated findings. Dig Dis Sci 2018;63:610-8. [CrossRef]
6. Cheng Y, Zhong C, Wu W. Association between anxiety, depression, and bowel air bubbles at colonoscopy: a prospective observational study. Ann Palliat Med 2021;10:3247257-3243257. [CrossRef]
7. Mutlu S, Yılmaz E, Şahin ST. The effect of position change and abdominal massage on anxiety, pain and distension after colonoscopy: a randomized clinical trial. Explore (NY) 2024;20:89-94. [CrossRef]
8. Tanrıverdi S, Kılıç SP. The effect of progressive muscle relaxation on abdominal pain and distension in colonoscopy patients. J Perianesth Nurs 2023;38:224-31. [CrossRef]
9. Bensusan IG, Martín PH, Álvarez VA. Prospective study of anxiety in patients undergoing an outpatient colonoscopy. Rev Esp Enferm Dig 2016;108:765-9. [CrossRef]
10. Yang C, Sriranjan V, Abou-Setta AM, Poluha W, Walker JR, Singh H. Anxiety associated with colonoscopy and flexible sigmoidoscopy: a systematic review. Am J Gastroenterol 2018;113:1810-8. [CrossRef]
11. Küçükakça Çelik G, Palabıyık Yılmaz D, Özer N, Erdağı Oral S. The Effect of Nature-Based Sounds Applied Before Colonoscopy on Patients' Pain, Anxiety, and Embarrassment: A Randomized Controlled Study. J Tradit Med Complement Ther 2022;5:245-54. [CrossRef]
12. Costello B, James T, Hall C, Shergill A, Schlossberg N. Does manual abdominal pressure during colonoscopy put endoscopy staff and patients at risk? Experiences of endoscopy nurses and technicians. Gastroenterol Nurs 2023;46(5):386-92. [CrossRef]
13. Topçu SY, Özkan ZK, Yılmaz B. The Effect of Abdominal Massage on Pain and Distention in Patients Underwent Colonoscopy-A Randomized Controlled Study. FBU-JOHS 2025;5(1):12-23.
14. Rosvall A, Axelsson M, Toth E, Kumlien C, Gershater MA. Patients' Experiences Before, During, and After a Colonoscopy Procedure. A Qualitative Study. Gastroenterol Nurs 2021;44:392-402. [CrossRef]
15. Johanna W, Yvonne W, Anna J, Kaisa F. Two sides of every coin: Individuals' experiences of undergoing colorectal cancer screening by faecal immunochemical test and colonoscopy. Eur J Public Health 2021;31:1290-5. [CrossRef]
16. Rosvall A, Annersten Gershater M, Kumlien C, Toth E, Axelsson M. Patient-reported experience measures for colonoscopy: a systematic review and meta-ethnography. Diagnostics 2022;12(2):242. [CrossRef]
17. He B, Xin Y, Li R, Lin FC, Zhang GM, Zhu HJ. Bowel preparation experiences and needs before follow-up colonoscopy in older adult postoperative colorectal cancer patients: A qualitative study. World J Gastrointest Surg 2024;16(9):2968. [CrossRef]
18. Saab O, Al-Obaidi H, Merza N, Bhagat U, Al-Sagban A, Algodi M, et al. The Impact of Visual Distraction Interventions on Patients' Pain and Anxiety During Colonoscopy: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. J Clin Gastroenterol 2024;10:1097. [CrossRef]
19. Öner N, LeCompte WA. Durumluk Surekli Kaygi Envanteri El Kitabi. Türkiye: Istanbul Bogazici Universitesi Yayinlari; 1983.p.1-26.
20. Spielberger CD, Gorsuch RL, Lushene R, et al. Manual for the State-Trait Anxiety Inventory. Palo Alto (CA): Consulting Psychologists Press; 1983. [CrossRef]
21. Cline ME, Herman J, Shaw ER, Morton RD. Standardization of the visual analogue scale. Nurs Res 1992;41:378-80. [CrossRef]
22. Eti-Aslan F. Pain Assessment Methods. Cumhur Univ Sch Nurs J 2002; 6:9-16.
23. Çakır SK, Evirgen S. The effect of virtual reality on pain and anxiety during colonoscopy: a randomized controlled trial. Turk J Gastroenterol 2021;32:451-7. [CrossRef]
24. Boustani H, Pakseresht S, Haghdoust MR, Qanbari S, Mehregan-Nasab H. Effect of psychological preparation on anxiety level before colonoscopy in outpatients referred to Golestan Hospital in Ahvaz. Front Biol 2017;12:235-9. [CrossRef]
25. Waddingham W, Kamran U, Kumar B, Trudgill NJ, Tsiamoulos ZP, Banks M. Complications of colonoscopy: common and rare recognition, assessment and management. BMJ Open Gastroenterol 2023;10:e001193. [CrossRef]
26. Bessissow T, Van Keerberghen CA, Van Oudenhove L, Ferrante M, Vermeire S, Rutgeerts P, et al. Anxiety is associated with impaired tolerance of colonoscopy preparation in inflammatory bowel disease and controls. J Crohns Colitis 2013;7:e580-7. [CrossRef]