

Parameters Affecting Bowel Preparation

Barsak Hazırlığını Etkileyen Parametreler

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Abstract

Introduction: Colonoscopy is the most effective tool for evaluating the colorectal mucosa and detecting polyps. The effectiveness of colonoscopy depends on the quality of bowel preparation. In the present study, we aimed to evaluate the parameters affecting bowel preparation before colonoscopic examination.

Methods: The study was conducted by retrospectively analyzing the medical records and colonoscopy reports of patients who underwent colonoscopy. Colon cleansing levels of the patients were evaluated using Boston Bowel Preparation Scale (BBPS).

Results: In the present study, 199 patients who underwent colonoscopy were evaluated. Of the patients, 100 (50.3%) were females and 99 (49.7%) were males. In 39 (19.6%) of the patients, the preparation was insufficient (BBPS <6), while in 160 (80.4%) patients, it was adequate (BBPS ≥6). While the preparation was insufficient in 7 (58.3%) of 12 hospitalized patients for whom we performed colonoscopy, 32 (17.1%) of 187 outpatients were inadequate. Colon preparation was statistically significantly worse in inpatients than in outpatients (p=0.003).

Discussion and Conclusion: Before colonoscopy in hospitalized patients, the general condition of the patients should be evaluated and an idea should be obtained about whether they can tolerate the cleaning solutions. If it is thought that patients will not be able to tolerate the solutions, the use of antiemetic drugs before solutions and the administration of the solutions with different beverages such as fruit juices over a longer period of time may increase toleration.

Keywords: Affecting parameters; Bowel preparation; Colonoscopy; Inpatients

Early detection of adenomatous polyps, which are the precursor lesions of colorectal cancers, plays a very important role in the prevention of these cancers.^[1] The most effective tool for the evaluation of colon mucosa is colonoscopy.^[2] The effectiveness of colonoscopy depends on the quality of intestinal preparation. Because it is only possible to evaluate the colonic mucosa clearly with opti-

mal colon cleansing, even a small amount of feces can reduce the quality of the procedure and prevent the detection of lesions.^[3,4] The guidelines stated that polyps larger than 5 mm should be visible for adequate colon cleansing.^[5] Unfortunately, approximately 25% of colonoscopic procedures have inadequate cleaning.^[6,7] Inadequate colon cleansing may reduce adenoma detection and cecum in-

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Table 1. Indication for colonoscopy

Indication	Patient count (n)	%
Constipation	56	28.1
Rectal bleeding	39	19.7
FOBT(+)	32	16
Chronic diarrhea	25	12.7
Anemia	24	12
Chronic abdominal pain	23	11.5
Total	199	100

FOBT: Fecal occult blood test.

tubation rates, prolonging the procedure time and electrocautery-related complications during polypectomy.^[7-9] In the literature, some parameters that may be related to bowel preparation have been reported.^[10-15] In the present study, we aimed to investigate the effective parameters of colon cleansing before colonoscopy.

Materials and Methods

The study was conducted by retrospectively analyzing the medical records and colonoscopy reports of patients who underwent colonoscopy in our endoscopy unit between July 2021 and April 2022. Patients were started on a watery soft diet 48 h before the day of the procedure, and colon cleansing was performed by applying oral 500 mL sennoside solution + rectal 210 mL sodium phosphate enema. Preprocedure consent was obtained from all patients. The procedure was performed by a gastroenterologist with Fujinon 7000 systems EC 760R Eluxeo video colonoscope (Japan) accompanied by moderate sedation. Patients' information was systematically collected from the hospital registry system as follows: (1) demographic data (age, gender, height, weight, and outpatient or inpatient); (2) indication for colonoscopy; (3) a history of chronic illness; and (4) level of education. Diabetes mellitus (DM), dementia, cerebrovascular event, heart failure, coronary artery disease, hypertension (HT), chronic renal failure, and cancer were accepted as chronic disease history. Patients were divided into illiterates and nonliterates in terms of education level. Colon cleansing levels of the patients were evaluated with the Boston Bowel Preparation Scale (BBPS). BBPS is a score developed in 2009 and confirmed in many studies. The BBPS divides the colon into three segments in the form of right, transverse, and left columns. Each segment is scored from 0 to 3, and 3 points indicate good bowel cleansing. The maximum total score is 9, and a score of 6 or above is considered adequate cleanliness.^[16-18] However, in the present study, we accepted cleanliness as insufficient if the BBPS score was 0 or 1 in any colon segment.

Table 2. Characteristics of patients undergoing colonoscopy

Feature	n (%)
Gender (female/male)	100 (50.3)/99 (49.7)
Median age (years)	49 (18-87)
Median BMI (kg/m ²)	26.3 (18.1-44.4)
Chronic disease (yes/no)	23 (11.6)/176 (88.4)
Source (inpatient/outpatient)	12 (6)/187(94)
Education(yes/no)	190 (95.5)/9 (4.5)
BBPS(<6/≥6)	39 (19.6)/160 (80.4)

BMI: Body mass index; BBPS: Boston Bowel Preparation Scale.

Statistical analyses were performed using the SPSS for Windows version 22.0 (IBM Co., Armonk, NY, USA). The Chi-squared test or Fisher's exact test (when the Chi-square test assumption did not hold due to low expected cell counts), where appropriate, was used to compare these proportions in different groups. A value of $p < 0.05$ was considered statistically significant. In the study, Helsinki Declaration Principles were complied with, and local ethics committee (28.01.2022, 2022/01) approval was obtained.

Results

In the present study, a total of 199 patients who underwent colonoscopy were evaluated. Of the patients, 100 (50.3%) were females and 99 (49.7%) were males. The most common indication for colonoscopy was constipation, followed by rectal bleeding (Table 1). The mean age was 49 (18-87) years. When patients were evaluated for the adequacy of colon cleansing using BBPS, 39 (19.6%) patients had inadequate cleanliness (BBPS <6), while 160 (80.4%) patients had adequate cleaning (BBPS ≥6). The mean BMI was 26.3 (18.1-44.4) kg/m², and 31 (15.6%) patients were obese (BMI ≥30 kg/m²). Of the total patients, 187 (94.0%) patients were outpatients, 12 (6.0%) were inpatients. Of the patients, 176 (88.4%) patients had no chronic disease and 23 (11.6%) patients had at least one history of chronic disease. Chronic diseases in our patients were as follows: Type 2 DM in 4 patients, HT in 12 patients, and HT and DM in 7 patients. Of the patients, 9 (4.5%) were illiterate, and the remaining 190 had varying degrees of education (Table 2). The evaluation was made in terms of the relationship between parameters and colon cleansing. Colon preparation was inadequate in 7 (58.3%) of 12 inpatients, while it was inadequate in 32 (17.1%) of 187 outpatients. In the analysis, colon cleansing was statistically significantly worse in inpatients than in outpatients ($p=0.003$). There was no statistically significant relationship between age, gender, BMI, presence of chronic disease, literacy, and other parameters such as colon cleansing adequacy ($p>0.05$) (Table 3).

Table 3. Evaluation of the relationship between parameters and bowel preparation

Parameter	Inadequate preparation (BBPS <6)		Adequate preparation (BBPS ≥6)		p
	n	%	n	%	
Age					0.099
<65	12	28.6	30	71.4	
≥65	27	17.2	130	82.8	
Sex					0.568
Female	18	18	82	82	
Male	21	21.2	78	78.8	
BMI					0.916
<25	14	20	56	80	
≥25	25	19.4	104	80.6	
Education					0.076
Yes	35	18.4	155	81.6	
No	4	44.4	5	55.6	
Source					0.003
Outpatient	32	17.1	155	82.9	
Inpatient	7	58.3	5	41.7	
Chronic disease					0.169
Yes	7	30.4	16	69.6	
No	32	18.2	144	81.8	

Demographic and perioperative data were compared using Student's t-test. For the evaluation of gender education and chronic disease, the Chi-squared test was used. BMI: Body mass index; BBPS: Boston Bowel Preparation Scale.

Discussion

As a result of our study, colon cleansing was statistically significantly worse in inpatients than in outpatients. In the literature, insufficient bowel preparation has been reported at rates ranging from 18% to 35%.^[19-21] In the largest study on this subject, 93 thousand patients were evaluated, and the inadequate preparation rate was determined as 23.6%.^[7] In a recent large study conducted by Mahmood et al.^[22] with an analysis of 24 studies, this rate was found to be 19.9%. In the present study, the inadequate preparation rate was 19.6%, which was consistent with the literature. In the present study, there was no statistically significant relationship between gender and colon preparation ($p=0.567$). In most of the earlier studies, insufficient preparation in men was reported at a higher rate, while in some studies, it was reported that the male gender had no effect on preparation.^[13,20,22-24] Very few studies have shown more inadequate preparation in women than in men.^[25] In the present study, bowel preparation was statistically significantly worse in inpatients than in outpatients ($p=0.003$). In previous studies, it has been reported that bowel preparation is worse in hospitalized patients.^[6,22] Although the cause of this situation

is not known precisely, two possible reasons have been reported. The first possibility is that inpatients are sicker than outpatients, and their oral intake is insufficient. Poor oral intake may prevent drinking of all of the preparatory preparations and may cause inadequate preparation.^[26] The second possible cause is that mobility may decrease depending on the severity of the disease in inpatients, and motility deficiency may occur in the digestive system. Insufficient motility may delay the delivery of stool to the rectum and be the cause of inadequate cleansing.^[27] There are many publications that show bowel preparation is more inadequate in patients with cirrhosis, DM, HT, coronary artery disease (CAD), stroke, and dementia.^[20,22,27-29] This condition is thought to be due to the effect of chronic diseases on gastrointestinal system motility. Impaired glycemia in DM, disruption of the autonomic nervous system in stroke patients, and drugs used in CAD or HT may impair gastrointestinal system motility.^[22] In this study, we did not find any relationship between the presence of chronic disease and bowel cleansing ($p=0.169$). Our patients had no chronic diseases other than DM and HT. When we examined the past records of our patients with DM, glycemic values were under control in all patients, and HbA1c values were below 7%. None of our patients with HT used calcium channel blockers, which may have the potential to impair gastrointestinal motility. For these reasons, we believe that colon preparation is not affected in our patients with chronic diseases. Obesity is associated with many diseases, especially metabolic syndrome,^[30] and studies have shown that obesity increases the risk of colon cancer.^[31] In the literature, there are mixed results in studies evaluating the effect of obesity on colon cleansing. Borg et al.^[24] reported that BMI ≥ 25 kg/m² was predictive of inadequate colon cleansing, while Fayad et al.^[28] reported that BMI ≥ 30 kg/m² was predictive. However, in other studies, no relationship was found between BMI and colon cleansing.^[27,29] There was no correlation between BMI and bowel cleansing in our study, which is consistent with some of the literature. In the present study, there was no statistically significant relationship between literacy and colon cleansing. There are almost no studies on this subject in the literature. In the study conducted by Akay et al.,^[32] colon cleansing was found to be worse in illiterates than in those who knew. This study was carried out in a state hospital where the patient density is very high in Türkiye. As far as we know, colon preparation in this hospital is given in written form rather than verbally telling the patients. Our study was conducted in a private hospital where the patient density was relatively low. In our hospital, colon preparation training is given to patients in detail by the nurse by allocat-

ing a certain period of time. We believe that this situation may have made colon preparation better in our illiterate patients. The fact that the number of patients in our study is relatively low is a limitation.

As a result, one of the most important factors for a good colonoscopic examination is adequate bowel preparation. Especially in inpatients, the general condition of the patients should be evaluated before colonoscopy, and an idea should be obtained about whether they can tolerate cleaning solutions. If it is thought that patients will not tolerate the solutions, the use of antiemetic drugs may be considered before solutions. Tolerantion can be increased by giving solutions with different beverages such as fruit juices in small quantities over a wider time interval. Nevertheless, a nasogastric catheter may also be considered for patients with poor oral intake. In addition, we believe that the service nurses' motivating the patients for their mobility and helping them when necessary can increase bowel motility and contribute to better cleaning.

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