

Factors Associated with Poor Colonoscopy Preparation

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Abstract

Introduction: Good bowel preparation is essential for a quality colonoscopy. Thus, evaluating the risk factors associated with poor preparation is necessary. This problem has not been widely addressed in Colombia. **Aim:** To identify the factors associated with poor intestinal preparation. **Materials and methods:** Observational, analytical, cross-sectional, multicenter study in patients > 18 years of age who underwent colonoscopy and attended gastroenterology services between January and June 2020 in Bogotá. A Boston scale > 6 was defined as good preparation, and a Boston scale ≤ 6 was defined as poor preparation. **Results:** 265 patients were included, of whom 205 (77.4%) were well prepared and 60 (22.6%) had inadequate preparation. Factors associated with poor bowel preparation were age older than 60 years (odds ratio [OR]: 1.359; 95% confidence interval [CI]: 1.059-1.745; $p = 0.026$); male sex (OR: 1.573; 95% CI: 1.128-2.194; $p = 0.012$); obesity (BMI > 30 kg/m²; OR: 2.539; 95% CI: 1.388-4.645; $p = 0.002$); constipation (OR: 1.924; 95% CI: 1.154-3.208; $p = 0.014$); the use of antidepressants (OR: 2.897; 95% CI: 1.199-6.997; $p = 0.014$) and calcium antagonists (OR: 2.445; 95% CI: 1.292-4.630; $p = 0.005$), and having abdominopelvic surgeries (OR: 1.325; 95% CI: 1.042-1.684, $p = 0.034$). Regarding the procedure, there was less polyp detection per patient ($p = 0.04$) and less minute ($p = 0.020$) and flat ($p = 0.047$) polyp detection in the poor bowel preparation group. **Conclusions:** This is the first study in Colombia in which the factors associated with poor intestinal preparation are described and include variables not explored in other studies. The results found are similar to those reported in the literature. These studies should be promoted with more patients, establishing a score for predicting poor preparation.

Keywords

Colonoscopy, preparation quality, preparation-related risk factors, preparation scales.

INTRODUCTION

Colon or colorectal cancer (CRC) is the third most common cancer in the world and the second cause of death from cancer⁽¹⁾. In Colombia, it is the fourth most common neoplasia in men and the second in women, with incidence rates increasing yearly⁽²⁾. Many studies conclude that CRC screening is cost-effective in the medium-risk population (without a family history and no medical history showing predisposition)⁽³⁾. We know that age (≥ 50 years), eating habits, and

tobacco are risk factors that increase the incidence of suffering from the disease^(4,5). In the general population, the risk is 5-6%, and this incidence increases substantially after age 50, so the population aged 50 or over is considered medium risk and should start a screening program⁽⁶⁾.

Furthermore, the degree of survival in patients with CRC is directly related to the extent of the disease on diagnosis. Individuals diagnosed in an advanced stage have a 5-year survival rate of 7%, while for individuals with CRC detected in an early stage, this rate is 92%⁽⁷⁾. Thus, the early

diagnosis of CRC intends to cure it and make preventive interventions that reduce the incidence of the disease and its morbidity and mortality rates. With screening technologies (occult blood, colonoscopy), CRC is highly preventable in more than 90% of cases⁽⁸⁻¹⁰⁾, given that in most cases, it is formed from polyps, whose detection and resection prevents the disease effectively⁽¹¹⁾. However, a careful colonoscopy and good preparation are essential because the safety and effectiveness of the examination will depend on it. Poor preparation affects an adequate colonoscopy in multiple ways since it unnecessarily prolongs the procedure, increases sedation requirements, results in numerous complications, and forces the suspension of the examination and its premature repetition^(5,12-14). It is accepted as an indicator of quality in a gastroenterology service that less than 15% of patients have poor preparation^(15,16). However, this is not the reality since up to a quarter of colonoscopies can be performed with inadequate bowel preparation.

Some factors can cause patients not to prepare adequately; some are associated with sociodemographic characteristics, age, sex, and education⁽¹²⁾, and others, such as clinical characteristics, history, diabetes, or neurological diseases such as cerebrovascular disease (CVD) dementia or Parkinson's^(11,17) are associated with the preparation type, as have been described in other studies⁽¹⁸⁻²⁰⁾.

Notably, good preparation allows polyps larger than 5 mm in diameter to be detected⁽⁶⁾. Poorly prepared patients are correlated with lower detection of polyps^(15,21). A meta-analysis of 27 studies found that inadequate bowel preparation for CRC screening by colonoscopy reduced the detection of small adenomas by 47% (odds ratio [OR]: 0.53; confidence interval [CI]: 0.46-0.62; $p < 0.001$) versus adequate preparation; This relationship was weak, but still significant for advanced adenomas (OR: 0.74, CI: 0.62-0.87; $p < 0.001$)⁽²²⁾. Additionally, poor preparation increases the need to repeat examinations at greater intervals and worsens patient satisfaction^(5,19).

Therefore, it is imperative to know the risk factors to identify which patients who undergo a colonoscopy may prepare poorly and try to prevent or minimize the risk as much as possible⁽⁴⁾. In Colombia, no studies have been conducted that allow us to know these factors, so we decided to carry out this prospective work with previously validated variables in the literature. The objective is to evaluate the risk factors associated with poor preparation for colonoscopy.

MATERIALS AND METHODS

Study design and participant selection

We conducted an observational, analytical, cross-sectional, multicenter study, including all adult patients over 18

who attended gastroenterology services during January and March 2020 in Bogotá. Consecutive patients aged 18 to 90 years who underwent colonoscopy were included. Before the colonoscopy, all patients were told not to stop taking medications for their chronic diseases. Patients with inflammatory bowel disease, history of colon surgery, known colonic stenosis or suspected obstructive tumor, toxic colitis or megacolon, pregnant or breastfeeding, or unable to give informed consent were excluded. The ethics committee of all participating institutions approved the study protocol and the informed consent form. Written informed consent was obtained from all patients.

Colonoscopy and data collection

Colonoscopies were performed by one of the senior endoscopists at each center, who had completed at least 1,000 colonoscopies. High-resolution video colonoscopes for adults (EC-S90WM, Fujinon, or CF-Q260, Olympus) were used.

Sociodemographic and clinical variables, product type used in the preparation, risk factors related to the preparation (vomiting, failure to follow the protocol, taste of the preparation, compliance, problems with taking it, associated adverse reactions), variables related to the procedure (time of arrival and removal from the cecum, scales used to evaluate adequate preparation, colon segment reached), adenoma detection rate (polyp type and size, location in the colon), and other endoscopic findings were collected. A univariate analysis was performed, and the absolute and relative frequencies were calculated for the qualitative variables and the measures of central tendency and dispersion for the quantitative variables. We employed the chi-squared test, Student's T-test, and Fisher's exact test to compare groups and the Wald chi-squared test for multivariate analysis, with a p -value of less than 0.05 for statistical significance.

Stages

The study was carried out in two stages: initially, a pilot test was performed on ten patients who responded to a survey, which allowed errors to be corrected and final forms to be prepared. Subsequently, the survey was conducted with all patients who attended colonoscopy in two centers, Hospital Universitario Nacional de Colombia and Hospital de Kennedy, in Bogotá between January and June 2020, and signed the informed consent to participate in this study.

Statistical analysis

The information obtained was tabulated on a database in Excel, which was used for a univariate and bivariate descriptive statistical analysis with all the sociodemographic

and clinical variables, adherence, comorbidity, and each dimension of the scale of bowel preparation, variables associated with the procedure and adenoma detection rate. Qualitative variables are presented as proportions through relative and absolute frequency. Normality was determined for the numerical variables, and the measures of dispersion and central tendency were expressed as mean and standard deviation or median and interquartile range (IQR). Chi-squared, Student's T, and Fisher's exact test were used for comparison between groups. Wald's chi-squared was used for multivariate analysis, with a p-value of less than 0.05 for statistical significance. All analyses were completed with the statistical package IBM SPSS Statistics 27.0.

Ethical aspects

It was a prospective study with minimal risk for patients according to Section 11 of Resolution 8430/1993 because we used data recording through standard procedures consisting of physical or psychological diagnostic examinations or routine treatments, psychological tests to groups or individuals where the subject's behavior was not manipulated, and commonly used drugs.

RESULTS

A total of 300 patients were surveyed, of which 35 were excluded, 13 had inflammatory bowel disease, nine had a history of colon surgery, five had known or suspected colonic stricture or obstructive tumor, and eight could not give informed consent.

Clinical and sociodemographic variables associated with bowel preparation

Of the 265 eligible patients, the mean age was 57.54 ± 17.33 years; anthropometric measurements are summarized in **Table 1**. The proportion of women was 65.2%. The most frequent indications were abdominal pain (28.6%), followed by digestive bleeding (18.1%), constipation (18.1%), and screening (7.9%). Besides, 157 (59.2%) patients had comorbidities, the most common of which were arterial hypertension (33.2%), hypothyroidism (15.8%), and diabetes mellitus (12.6%). Among the pharmacological history, 133 (50.1%) patients used some drug; of the medications that affect gastric emptying, it was found that 4.9% used opioids, 6.7% antidepressants, and 12% calcium antagonists. Regarding the history of abdominopelvic surgery other than colorectal, 136 (51.3%) patients had it, while 11 patients (4.15%) had a personal history of colon cancer and 25 (9.4%) had a family history. Fifty-

six (21.1%) patients were hospitalized, 192 (72.4%) used polyethylene glycol with electrolytes (PEG) as preparation, 18 (6.8%) picosulfate, 53 (20%) oral phosphate, and only two (0.9%) sulfates. The patients were asked about the taste of the preparation; 73 (27.5%) said it was good, 109 (41.1%) tolerable, and 83 (31.3%) unpleasant. The most common adverse effects were nausea or vomiting in 128 (48.3%) patients, abdominal distension in 30 (11.3%), and abdominal pain in 16 (6%). When the patients were asked if they fully followed the preparation instructions, 237 (89.4%) reported following 100% of the instructions, 24 (9.1%) more than 75%, and 4 (1.5%) less than 75%.

Regarding the variables related to the procedure, sedation was used in 115 (43.3%), and the interval between the completion of the preparation and the start of the colonoscopy was less than 4 hours in 61 (23%) patients and greater than this interval in 204 (77%). The average cecal intubation time was 7.75 ± 5.30 minutes, and the average withdrawal time was 7.45 ± 3.13 minutes, with parametric distribution. A complete exploration was performed, reaching the ileum or cecum in 259 (97.7%) patients. Polyps were detected in 85 (32%) patients, with an average number of polyps per patient of 2.36 ± 1.38. The most common polyp type was sessile, followed by flat and tiny (**Table 1**).

General population data associated with poor preparation

Each of the variables was grouped and analyzed concerning the Boston scale > 6 (adequate intestinal preparation) or 6 or less (inadequate intestinal preparation). At this point, we should clarify that we do not use the traditional poor preparation cut-off point of < 6 on the Boston scale but rather 6 or less, as proposed by Clark et al. (23), given that this cut-off point allows better adherence to the follow-up intervals indicated in the guidelines. Among the clinical and sociodemographic variables, it was found that those over 60 years of age (OR: 1.359; 95% CI: 1.059-1.745; $p = 0.026$), the male sex (OR: 1.573; 95% CI: 1.128-2.194; $p = 0.012$), obesity (BMI >30 kg/m²; OR: 2.539; 95% CI: 1.388-4.645; $p = 0.002$), and constipation as an indication for the procedure (OR: 1.924; 95% CI: 1.154-3.208; $p = 0.014$) have a statistically significant association with poor preparation. Regarding history, the use of drugs that affect gastric emptying such as antidepressants (OR: 2.897; CI: 1.199-6.997; $p = 0.014$) and calcium antagonists (OR: 2.445; CI: 1.292-4.630; $p = 0.005$), and abdominopelvic surgeries other than colon surgery (OR: 1.325; CI: 1.042-1.684; $p = 0.034$) also have a statistically significant association (**Table 2**).

Table 1. Study characteristics (n = 265)

Age, mean and (SD)	57.54 ± 17.33	Preparation type	
Weight (kg), mean, and (SD)	65.43 ± 12.87	- PEG	192 (72.4%)
Size (m), mean, and (SD)	1.60 ± 0.96	- Picosulfate	18 (6.8%)
BMI (kg/m ²), mean, and (SD)	25.22 ± 4.17	- oral phosphate	53 (20%)
Female n (%)	173 (65.2%)	- Sulfates	2 (0.9%)
Male n (%)	92 (34.7%)	Bowel preparation taste	
Obesity n%	35 (13.2%)	- Good	73 (27.5%)
Indication		- Tolerable	109 (41.1%)
- Abdominal pain	76 (28.6%)	- Unpleasant	83 (31.3%)
- Screening	21 (7.9%)	Adverse effects	
- Digestive bleeding	48 (18.1%)	- Nausea or vomiting	128 (48.3%)
- Constipation	48 (18.1%)	- Abdominal distension	30 (11.3%)
- Monitoring	19 (7.2%)	- Abdominal pain	16 (6.0%)
- Anemia	9 (3.4%)	Compliance with preparation	
- Diarrhea	17 (6.4%)	- 100%	237 (89.4%)
- Other	27 (10.1%)	- > 75%	24 (9.1%)
Comorbidities	157 (59.2%)	- < 75%	4 (1.5%)
Comorbidity type		Sedation	115 (43.3%)
- Arterial hypertension	88 (33.2%)	Colonoscopy preparation interval	
- Diabetes mellitus	33 (12.4%)	- < 4 hours	61 (23%)
- COPD	9 (3.4%)	- > 4 hours	204 (77%)
- CVD	4 (1.5%)	Arrival time (min), mean (SD)	7.75 ± 5.30
- Cirrhosis	2 (0.7%)	Withdrawal time (min)	7.45 ± 3.13
- Kidney injury	2 (0.7%)	Colon segment reached	
- Hypothyroidism	42 (15.8%)	- Distal ileum	32 (12.1%)
- Autoimmune hepatitis	1 (0.4%)	- Cecum	227 (85.6%)
- HIV	5 (1.8%)	- Another segment of the colon	6 (2.3%)
Pharmacological history	133 (50.1%)	Polyps	
Drug type		- # of patients with polyps	85 (32%)
- Opioids	13 (4.9%)	- # of polyps per patient mean (SD)	2.36 ± 1.38
- Antidepressants	18 (6.7%)	- Right colon (cecum to the hepatic flexure)	51 (19.2%)
- Calcium antagonists	32 (12%)	- Left colon	56 (21.1%)
History of abdominopelvic surgery (other than colorectal surgery)	136 (51.3%)	Polyp type	
Family history of colon cancer	25 (9.4%)	- Tiny	32 (12%)
Hospitalization	56 (21.1%)	- Sessile	42 (15.8%)
		- Pedicled	19 (7.2%)
		- Flat	34 (12.8%)

SD: standard deviation; COPD: chronic obstructive pulmonary disease; CVD: cerebrovascular disease; BMI: body mass index; PEG: polyethylene glycol with electrolytes; HIV human immunodeficiency virus. Table prepared by the authors.

Association between poor bowel preparation and lesion detection

Once the procedure started, the poor preparation group had a shorter withdrawal time without reaching statistically

significant differences (7.03 ± 2.07) ($p = 0.088$). Regarding the detection of colon polyps, poor intestinal preparation decreases the average detection of polyps per patient (2.36 ± 1.38 in the general population and 1.79 ± 1.27 in the poor preparation group) with a statistically significant associa-

Table 2. General population data associated with poor preparation (n = 60 patients)

	n	%	Mean (SD)	Adjusted OR	P
Age			59,95 ± 16,94		0.222*
- Age less than 60 years (n = 135)	23	17		0.702 (0.497-0.990)	0.026*
- Age over 60 years (n = 130)	37	28.5		1.359 (1.059-1.745)	
Sex					
- Male	29	31.5		1.573(1.128-2.194)	0.012*
- Female	31	17.9			
Obesity BMI (kg/m ²) >30	16	45.7		2.539 (1.388-4.645)	0.002*
Indication					
- Abdominal pain	12	17.7		0.638 (0.370-1.100)	0.087*
- Screening	0	0		0.754 (0.702-0.810)	0.005*
- Digestive bleeding	13	27.1		1.063 (0.891-1.293)	0.426*
- Constipation	18	37.5		1.924 (1.154-3.208)	0.014*
- Monitoring	3	15.7		0.912 (0.742-1.122)	0.579*
- Anemia	4	44.4		1.406 (0.781-2.532)	0.121*
- Diarrhea	5	29.4		1.102 (0.805-1.509)	0.549*
Comorbidities (n = 157)	37	23.5		0.968(0.763-1.229)	0.664*
Comorbidity type					
- Arterial hypertension	25	28.4		1.121 (0.964-1.303)	0.253*
- Diabetes mellitus	7	21.2		0.979 (0.810-1.185)	0.834*
- COPD	4	44.4		1.406 (0.781-2.532)	0.112*
- Hypothyroidism	10	23.8		1.068 (0.558-2.044)	0.844*
Pharmacological history	31	23.3		0.943 (0.604-1.471)	0.795*
Drug type					
- Opioids	4	30.8		1.386 (0.445-4.381)	0.521*
- Antidepressants	9	50		2.897 (1.199-6.997)	0.014*
- Calcium antagonists	15	46.9		2.445 (1.292-4.630)	0.005*
History of abdominopelvic surgery	38	27.9		1.325 (1.042-1.684)	0.034*
Personal history of colon cancer	4	36.4		1.952(0.591-6.445)	0.276*
Family history of colon cancer	2	8		0.297(0.072-1.224)	0.079*
Hospitalization	15	26.7		1.250(0.746-2.096)	0.404*
Preparation type					
- PEG	44	22.9		0.986(0.824-1.180)	0.877
- Picosulfate	2	11.1		2.341 (0.554-9.898)	0.380*
- Travad oral	14	26.4		1.221(0.712-2.091)	0.474*
Preparation taste					
- Good	15	20.5		0.865 (0.530-1.412)	0.556*
- Tolerable	25	22.9		0.995 (0.706-1402)	0.979*
- Unpleasant	20	24.1		1.133 (0.756-1.696)	0.551*
Adverse effects					
- Nausea or vomiting	27	21.1		0.894 (0.653-1.224)	0.472*
- Abdominal distension	5	16.7		0.666 (0.266-1.664)	0.374*
- Abdominal pain	3	18.7		0.772 (0.227-2.620)	1*
Compliance with preparation					
- 100%	51	21.5		0.913 (0.855-1.073)	0.309*
- > 75%	8	33.3		1.672 (0.752-3.718)	0.208*
- < 75%	1	25		1.091 (0.116-10.306)	1*
Track time (interval from the end of preparation and the start of colonoscopy)					
- < 4 hours	14	22.9		1.164 (0.810-1.509)	0.761*
- > 4 hours	46	22.5		0.953 (0.809-1.123)	
Sedation	29	25.2		1.104 (0.810-1.506)	0.540+

*Calculated by Student's T-test. +Calculated by chi-squared test. ^Calculated by Fisher's exact test (less than five values in any of the cells). Table prepared by the authors.

Table 3. Factors derived from the endoscopic procedure associated with bowel preparation

	n	%	Mean (SD)	Adjusted OR	p
Arrival time (min)			7.19 ± 6.23		0.171*
Withdrawal time (min)			7.03 ± 2.07		0.088*
Colon segment reached					
- Distal ileum	8	25		1.132 (0.626-2.622)	0.473*
- Cecum	48	21.1		0.914 (0.785-1.035)	0.112*
- Another segment of the colon	4	66.7		6.548 (1.229-34.904)	0.028^
Polyps					
- # of patients with polyps	19	22.3		1.943(0.617-1.440)	0.783*
- # of polyps per patient			1.79 ± 1.27		0.047*
- Right colon	8	15.7		0.609 (0.303-1.225)	0.148*
- Left colon	11	19.6		0.800 (0.442-1.451)	0.455*
Polyp type					
- Tiny	2	6.2		0.228 (0.056-0.926)	0.022*
- Sessile	9	21.4		0.932 (0.473-1.837)	0.838*
- Pedicled	5	26.3		1.247 (0.468-3.320)	0.659*
- Flat	3	8.82		0.331 (0.105-1.044)	0.047^

*Calculated by Student's T-test. +Calculated by chi-squared test. ^Calculated by Fisher's exact test (less than five values in any of the cells). Table prepared by the authors.

Table 4. Multivariate regression analysis

Variable	p*	Multivariate OR
Age over 60 years	0.010	2.448
Male sex	0.029	2.081
Obesity	0.063	2.165
Indication of constipation	0.014	2.560
Calcium antagonists	0.034	3.674
Antidepressants	0.114	1.372
Abdominopelvic surgery	0.132	1.682

*Calculated by Wald chi-squared. Table prepared by the authors.

tion ($p = 0.04$). Similarly, poor preparation decreases the ability to detect tiny (OR: 0.228; 95% CI: 0.056-0.926; $p = 0.020$) and flat polyp (OR: 0.047; 95% CI: 0.105-1.044; $p = 0.047$), also with statistical differences (**Table 3**).

Multivariate regression analysis

A multivariate analysis found that the variables mostly retained significance except for obesity, use of antidepressants,

and history of abdominal-pelvic surgery, which do not reach statistical significance when their impact is measured based on other variables.

On the variables that reach significance in the multivariate analysis, the omnibus model coefficient test was performed with a p -value <0.001 , which means that they effectively predict poor preparation with these variables. Finally, the Hosmer-Lemeshow test was performed, and it was found that the combination of these variables indicates poor preparation in 78.1% of the patients (**Table 4**).

DISCUSSION

This is the first study in Colombia that evaluates the factors associated with poor intestinal preparation, with several clinical variables not described in other studies. Evidence of moderate quality indicates that the patients' epidemiological and clinical characteristics can predict the colonoscopy preparation's failure^(6,12,24,25). However, none of these variables have been tested in our population, so creating a clinical prediction score with more patients is the first step.

Two hundred sixty-five patients from two quaternary care hospitals in Bogotá were included. Regarding age, the data reported in the literature are consistent with the fact that older age is associated with poor preparation^(5,26). Male sex is a variable related to constant poor intestinal preparation in

most series reported in other countries^(6,27,28), data consistent with our study, in which the male sex had a rate of inadequate preparation of 48.3%, significantly higher than in women. No explicit or organic cause explains these findings. Still, it is possibly justified by social conditions, which have shown that men generally have lower adherence rates to medical treatments and recommendations. Anthropometric measurements have been studied in other series, suggesting that obesity^(26,29) may be related to poor preparation. This agrees with our study and is probably explained because, in these patients, some diseases cause more slow intestinal transit, such as diabetes or constipation.

There are different indications for performing a colonoscopy. As in reports worldwide, abdominal pain was the most frequent in our population^(12,29). Digestive bleeding and constipation occurred more frequently in the poor preparation group, but only constipation had a statistically significant association. This has happened in other series and is related to a poor laxative response to the means used in the preparation^(6,30). There was a high prevalence of comorbidities in this population, of which hypertension, diabetes *mellitus*, and hypothyroidism are the most frequently reported pathologies, probably because most patients were obese, which impacts the prevalence of cardiovascular disease. No differences were found in comorbidities and intestinal preparation, although in some series, it has been found that diabetes *mellitus* is associated with poor preparation^(29,31). It would be interesting to determine if the time of evolution of the disease or the documentation of micro- or macrovascular complications is related to these findings.

Most patients used drugs chronically; antidepressants and calcium antagonists were associated with poor intestinal preparation, consistent with other series^(14,31) since they affect gastric emptying. Similarly, a history of abdominopelvic surgery was related to poor intestinal preparation, possibly due to flanges and adhesions, which makes intestinal transit difficult and leads to trapping debris in the intestinal lumen, as mentioned in other studies^(27,30,32).

As in other studies, PEG with electrolytes is the most used preparation^(27,33). However, no differences were found regarding the preparation type, taste, adverse effects, and compliance. It would be essential to study these variables in a larger population, specify the number of doses and quantity, and objectively assess non-compliance.

Regarding the lead time (last dose of the preparation and the start of the colonoscopy), no statistically significant differences were found, which is incongruent with the

literature, in which a statistical association is reported⁽¹²⁾. However, in these series, the cut-off point is 5 hours.

Concerning the variables derived from colonoscopy, we found that poor preparation is associated with a lower number of polyp detection per patient and a lower detection of tiny and flat polyps, consistent with other studies^(6,11,34). A multicenter prospective study identified that inadequate preparation is associated with lower detection of polyps of any size⁽²⁶⁾. Another retrospective database showed that adequate preparation resulted in the identification of advanced lesions (>9 mm)⁽³⁵⁾.

Finally, it should be noted that our results are similar to recent meta-analyses^(6,22,33) that included 67 and 24 studies with more than 75,000 and almost 50,000 participants, in which they evaluated the risk factors for poor preparation. Baseline patient characteristics (increasing age and male sex), clinical conditions (constipation, diabetes *mellitus*, hypertension, cirrhosis, stroke, and dementia), and drug use (narcotics and tricyclic antidepressants) were identified as predictors of preparation failure. Moreover, neither of the two meta-analyses managed to identify obesity or previous abdominal surgery as a predictor, which was done in our study but had inconsistent results in the history of colon preparation failures.

LIMITATIONS

The endoscopists were blinded to our research questions and recorded the data on Google Drive. However, some limitations must be addressed. Firstly, socioeconomic status, education, or rural or urban origin were not evaluated. Second, this study allows for inferences regarding associations but not causality due to its observational nature. These follow-up procedures could be considered in future studies.

CONCLUSIONS

To our knowledge, this is the first study in Colombia that describes the factors associated with poor intestinal preparation. The results are similar to those reported in the literature, allowing us to identify this subgroup of patients (poorly prepared) to perform a quality colonoscopy. Given that some factors were not significant (although a trend was present) due to the small sample size, this type of study should be promoted with a more substantial number of patients in different centers and the possibility of a score to predict poor preparation.

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