







# Patients' Description of Rectal Effluents Help Predict the Quality of Colonoscopy Preparation

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## Abstract

**Introduction** Evaluation of patients' reports of characteristics of rectal effluents as a predictor of the quality of the colonoscopy preparation assessed by the endoscopist.

**Methods** A total of 270 patients, aged 18 or older, were consecutively included to perform an outpatient colonoscopy, for a period of 8 months. Demographic and clinical data were collected and evaluated, as well as the rectal effluents' characteristics and data concerning the colonoscopy. The quality of bowel preparation was evaluated by employing the Boston Bowel Preparation Scale. The association between rectal effluents and the quality of preparation was verified by binary logistic regression.

**Results** Of the 270 patients, 67.3% were female, with a mean age of  $59.69 \pm 12.48$  years. Reports of dark and thick, dark orange, or brown and thick effluents produced a higher likelihood of inadequate preparation (OR 4.26, CI 95% 1.51; 11.14,  $p = 0.004$ ).

**Conclusions** Reports of dark and thick, dark orange, or brown and thick rectal effluents are predictors of inadequate preparation in the endoscopist assessment.

## Keywords

- ▶ colonoscopy
- ▶ rectal effluents
- ▶ bowel preparation

## Introduction

Colonoscopy represents the most important method of evaluation of the lower gastrointestinal tract, allowing a complete assessment of the colonic mucosa.<sup>1</sup> Studies have that about 25% of the patients exhibited inadequate colonoscopy preparation,<sup>2,3</sup> which denotes lower detection rates of preneoplastic lesions, an increased rate of complications during the procedure, as well as higher direct and indirect costs compared to procedures performed under ideal preparation.<sup>4,5</sup>

In a meta-analysis that evaluated the impact of bowel preparation quality on adenoma detection rate, it was established that inadequate preparation is significantly associated with a lower adenoma detection rate<sup>6</sup> and, consecutively, with an increased likelihood of interval cancer and mortality from colorectal cancer.<sup>7</sup>

In practice, prior to the procedure, the patient is questioned about the aspect of their rectal effluents to predict the quality of preparation. Three papers, two from the United States and one from South Korea approach this subject, though none of them demonstrated great consensus between patients' descriptions and the endoscopist's assessment.<sup>8–10</sup>

Our main goal was to evaluate the patients' reports of the rectal effluent characteristics as a predictor of the quality of colonoscopy preparation as assessed by the endoscopist.

## Methods

A total of 270 patients, aged 18 or older, were consecutively included to perform an outpatient colonoscopy, for a period of 8 months. They were referred to the Endoscopy Service of the General Hospital of Vitória da Conquista, Bahia, for the

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**Fig. 1** Patient's description of the color of rectal effluents and the correlation with the quality of bowel preparation.

procedure. The study protocol followed the principles of the Declaration of Helsinki and was approved by the Ethics Committee of the Federal University of São Paulo (CAAE 23020319.3.00000.5505).

The following were used as exclusion criteria: formal restriction for the procedure (suspected colon perforation, toxic megacolon, severe colitis); patients with a medical history of inflammatory bowel disease; inability to properly comprehend the preparation instructions; patients who have undergone partial or total colectomy; patients scheduled for advanced therapeutic procedures (e.g., pre-scheduled polypectomy or mucosectomy); incomplete colonoscopy due to endoscopy restriction. The assigned nurse explained in verbal and written form the instructions for bowel preparation, followed by the patient's signature on the Informed Consent Form.

On the day of the procedure, prior to the examination, another nurse from the research team oversaw the clinical and epidemiological data questionnaires and collected data about the last rectal effluent. The description of the last rectal effluent was guided by **Figure 1**, and the patient should indicate which characteristic best matched the graph.

The two assigned endoscopists in charge of performing the procedures were unaware of the descriptions of rectal effluents provided by the patients. All participants underwent preparation by oral administration of two sachets of a laxative (PicoPrep<sup>®</sup>) consisting of 10.0 mg of sodium picosulfate, 3.5 g of magnesium oxide, and 12.0 g of citric acid anhydrous, as per verbal and written instructions.

All colonoscopies were performed in the afternoon. The preparation regimen used was the "split-dose" regimen. The Boston Bowel Preparation Scale was employed for comparison with the descriptions provided by the patients. A score of  $\geq 2$  in each segment was evaluated as adequate, and a score of  $\leq 1$  was inadequate. Prior to the start of the study, the endoscopists watched a video on the evaluation of colonoscopy preparation

using the Boston Bowel Preparation Scale as a method of enhancing the results' consensus.<sup>11</sup> Each of them had great experience in conducting the procedure, with more than 3,000 colonoscopies performed by each one.

### Statistical Analysis

The following descriptions by patients before the procedure were considered inadequate preparation: dark, thick, and with particles; brown, thick, and with particles; and semi-clear dark orange. Mostly clear light orange and clear light yellow were considered adequate. Similarly, in the endoscopist's assessment, a Boston score of  $\geq 6$  indicated adequate preparation, while a Boston score of  $< 6$  indicated inadequate preparation.

Qualitative variables were represented as absolute and relative frequencies, while quantitative variables were represented by mean  $\pm$  standard deviation (median). The latter ones were subjected to the Shapiro-Wilk test.

The connection between sociodemographic, clinical, and rectal effluent aspects as well as the quality of preparation, was assessed by the binary logistic regression model, with results presented as an odds ratio (OR) and their respective confidence interval (CI) of 95%. Additionally, there was also an examination of the sensitivity and specificity of rectal effluent reports regarding the quality of preparation as assessed by the endoscopist. The analyses were conducted using the R 4.0.5 software, and a level of  $p < 0.05$  was considered statistically significant.

## Results

### Patients' Characteristics and Demographic Findings

**Table 1** illustrates the demographic and clinical characterization of the entire sample, which consisted of 270 subjects: 67.4% were female; with a mean age of  $56.69 \pm 12.48$  years; and 40% had finished primary education. More than half

**Table 1** Sample's demographic and clinical characterization

| Characteristics                    | Total (n = 270)          | P-value            |
|------------------------------------|--------------------------|--------------------|
| <b>Sex</b>                         | 182 (67.4%)              | 0.796 <sup>Q</sup> |
| Female                             | 88 (32.5%)               |                    |
| Male                               |                          |                    |
| <b>Age</b><br>(mean ± SD (median)) | 56.69 ± 12.48<br>(57.00) | 0.216 <sup>T</sup> |
| < 60 years                         | 161 (59.6%)              |                    |
| 60 years and older                 | 109 (40.4%)              |                    |
| <b>Educational level</b>           | 36 (13.3%)               | 0.899 <sup>Q</sup> |
| Illiterate                         | 108 (39.7%)              |                    |
| Primary education                  | 40 (14.8%)               |                    |
| Lower secondary education          | 76 (28.1%)               |                    |
| High school                        | 10 (3.7%)                |                    |
| Higher education                   |                          |                    |
| <b>Colonoscopy indication</b>      | 142 (52.5%)              | 0.712 <sup>Q</sup> |
| Prevention                         | 111 (41.1%)              |                    |
| Diagnosis                          | 17 (6.2%)                |                    |
| Post-polypectomy follow-up         |                          |                    |
| <b>Associated diseases</b>         | 33 (12.2%)               | 0.582 <sup>Q</sup> |
| Diabetes                           | 6 (2.2%)                 | 0.684 <sup>F</sup> |
| Depression                         | 56 (20.7%)               | 1.000 <sup>Q</sup> |
| Constipation                       |                          |                    |
| <b>Medication use</b>              | 29 (10.7%)               | 0.562 <sup>Q</sup> |
| Hypoglycemic agents                | 10 (3.7%)                | 0.540 <sup>Q</sup> |
| Antidepressants                    |                          |                    |
| <b>Surgical history</b>            | 51 (18.8%)               | 0.090 <sup>Q</sup> |
| Abdominal                          | 95 (52.1%)               | 0.948 <sup>Q</sup> |
| Gynecological* (n = 182)           |                          |                    |

<sup>Q</sup> Chi-squared test, <sup>F</sup> Fisher's exact test, <sup>T</sup> Student's t-test for independent samples.

\* Gynecological surgeries were evaluated only in women.

(52.6%) of the colonoscopies were performed as a means of prevention, and, among associated diseases, 21.0% had constipation, 12.2% had diabetes, and 2.2% had depression. Only 11.0% made use of hypoglycemic agents, and 4.0% took antidepressants. Prior abdominal surgeries accounted for 18.8%, and 52.1% of gynecological surgeries were reported by women.

### Colonoscopy Results

Cecal intubation could be accomplished in all colonoscopies.

Adenoma detection rate in the sample was 27.2% (CI 95% 21.9%; 32.5%), with 25.1% (CI 95% 18.8%; 31.4%) for women, and 31.5% (CI 95% 21.8%; 41.2%) for men. Diverticula were detected in 24.6% of the procedures (CI 95% 19.5%; 29.7%), as shown in ►Table 2.

### Consensus between Rectal Effluents Reports and the Quality of Bowel Preparation.

►Table 3 shows that the reports of effluents that were dark and thick, brown and thick, or dark orange indicated increased rates of inadequate preparation (OR 4.26, CI 95% 1.51; 11.14,  $p=0.004$ ), as well as when adjusted for sex, educational level, presence of diverticula and colonoscopy indication (OR 3.58, CI 95% 1.22; 9.74,  $p=0.015$ ). Reports of dark and thick, brown and thick, or dark orange

**Table 2** Evaluation of colonoscopy outcomes

| Variables                     |            |
|-------------------------------|------------|
| <b>Adenoma detection rate</b> | 74 (27.2%) |
| Female                        | 46 (25.1%) |
| Male                          | 28 (31.5%) |
| <b>Diverticula</b>            | 67 (24.6%) |

Chi-squared test.

effluents displayed a sensitivity of 30.4% and specificity of 90.7% for assessing inadequate preparation.

### Accuracy of Patient Assessment

►Table 4 indicates that patients with more than eight years of education had a higher likelihood of accurately assessing rectal effluents (OR 3.70, CI 95% 1.61; 10.06,  $p=0.005$ ), as well as when adjusted for age group and associated diseases (OR 3.84, CI 95% 1.64; 10.60,  $p=0.005$ ).

### Discussion

There is limited literature on patients' perceptions of the quality of bowel preparation. In 2004, Harewood, Wright, and Baron<sup>8</sup> evaluated the descriptions of rectal effluents by 474 patients who underwent outpatient colonoscopy. The authors concluded that the patients either overestimated or underestimated the quality of rectal effluents when compared to the endoscopist's assessment.

In a subsequent study published by Fatima, Johnson, and Rex<sup>9</sup> in 2010, 429 subjects underwent outpatient colonoscopy in three different hospitals. A slight consensus was verified between the patients' description of rectal effluents and the endoscopist's assessment. However, there was a higher likelihood of inadequate preparation when the effluent description was solid or liquid brown. It is also important to note that both studies did not employ a validated colonoscopy preparation assessment scale.

In 2015, So et al.<sup>10</sup> assessed the description of 138 individuals about their last three rectal effluents, with photographic examples provided as scoring and employment of the Aronchick scale. The images with clear rectal effluents were assigned a score of 1, up to 5 for semi-solid stool effluents. A score of 3 in the sum of the last three rectal effluents represented the most adequate reported preparation. The authors found statistical significance, although with poor clinical relevance. The study had several limitations, including being conducted by a single endoscopist, the inappropriate use of the Aronchick scale as it is impractical and unreliable in practice, and relying on patients' accurate recall of their last three effluents.

In the present study, there was a four times higher chance of inadequate preparation when the description of rectal effluents was that it was dark and thick, brown, and thick, or dark orange (OR 4.26, CI 95% 1.51; 11.14,  $p=0.004$ ). This finding is similar to the one reported by Fatima, Johnson, and Rex,<sup>9</sup> and as practical applicability, may optimize preparation before patient sedation and the start of the procedure. As suggested

**Table 3** Predictor of quality of inadequate preparation

| Variables                                       | Gross              |              | Adjusted          |              |
|---|--------------------|--------------|-------------------|--------------|
|   | OR (CI 95%)        | P-value      | OR (CI 95%)       | P-value      |
| <b>Sex</b>                                      |                    |              |                   |              |
| Female  | 1.00               | –            | 1.00              | –            |
| Male  | 2.44 (1.02; 5.85)  | <b>0.043</b> | 2.31 (0.94; 5.75) | 0.068        |
| <b>Educational level</b>                        |                    |              |                   |              |
| Less than 8 years                               | 1.00               | –            | 1.00              | –            |
| 8 years or higher                               | 0.29 (0.07; 1.09)  | 0.054        | 0.37 (0.08; 1.17) | 0.128        |
| <b>Diverticula</b>                              |                    |              |                   |              |
| No  | 1.00               | –            | 1.00              | –            |
| Yes   | 0.62 (0.18; 1.73)  | 0.403        | 0.81 (0.22; 2.39) | 0.722        |
| <b>Report of rectal effluents</b>               |                    |              |                   |              |
| Dark and thick, brown and thick, or dark orange | 4.26 (1.51; 11.14) | 0.004        | 3.58 (1.22; 9.74) | <b>0.015</b> |
| Light yellow or light orange                    | 1.00               | –            | 1.00              | –            |

**Table 4** Factors associated with patient's assessment accuracy (whether the patient's assessment matched the endoscopist's)

| Variables                  | Gross              |              | Adjusted           |              |
|----------------------------|--------------------|--------------|--------------------|--------------|
|                            | OR (CI 95%)        | P-value      | OR (CI 95%)        | P-value      |
| <b>Age group</b>           |                    |              |                    |              |
| < 60 years                 | 1.00               | –            | 1.00               | –            |
| 60 years and older         | 1.04 (0.55; 2.03)  | 0.895        | 1.27 (0.64; 2.57)  | 0.496        |
| <b>Educational level</b>   |                    |              |                    |              |
| Less than 8 years          | 1.00               | –            | 1.00               | –            |
| 8 years or higher          | 3.70 (1.61; 10.06) | <b>0.005</b> | 3.84 (1.64; 10.60) | <b>0.005</b> |
| <b>Associated diseases</b> |                    |              |                    |              |
| Diabetes                   | 0.95 (0.39; 2.68)  | 0.919        | 0.82 (0.32; 2.42)  | 0.705        |
| Depression                 | 0.40 (0.08; 2.95)  | 0.299        | 0.40 (0.07; 3.12)  | 0.324        |
| Constipation               | 1.97 (0.84; 5.39)  | 0.147        | 1.72 (0.72; 4.80)  | 0.255        |

by a reference service in colonoscopy, following the reports of inadequate effluents, patients could be encouraged to keep consuming the laxative, as well as postpone the procedure and contact a nurse or the clinic's department if there are any doubts about adequate preparation.<sup>12</sup>

In this study, we assessed that the subjects with higher levels of education (> 8 years) had a greater chance of accurately evaluating their rectal effluents. This finding differs from what was detected in the works of Harewood, Wright and Baron<sup>8</sup> and Fatima, Johnson, and Rex,<sup>9</sup> where both showed that the variables that had higher accuracy were body mass index < 30, use of medications for constipation, use of sodium phosphate as a laxative for preparation, and age below 60 years, respectively.

## Conclusion

Reports of dark and thick, dark orange or brown and thick rectal effluents are predictors of inadequate preparation in the endoscopist's assessment.

### Conflicts of Interest

The authors declare no conflicts of interest.

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