

## Adenoma detection rate in gastroenterology residents: a retrospective study in a gastroenterology clinic

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### Abstract

**Introduction and objectives:** The adenoma detection rate (ADR) is defined as the presence of at least 1 adenoma in patients  $\geq 50$  years on a screening colonoscopy. This becomes important due to the association of adenomas and colorectal cancer. It is recommended to have an ADR of 25% in men and women  $\geq 50$  years. Our goal was to know the ADR of gastroenterology fellows versus attending physicians. **Materials and methods:** We performed an observational, descriptive, and retrospective study where we reviewed medical records of patients who underwent a colonoscopy in the period of 2 years. Demographic, clinical data and the ADR of fellows and attending physicians were analyzed. **Results:** We evaluate 363 procedures: Fellows performed 279 and attending physicians performed 84. Polyps were found in 112 patients, and the mean age was 58 years (17-90). The ADR for men and women  $\geq 50$  years for fellows and attending physicians was 23% versus 31.7% ( $p = 0.18$ ) respectively. **Conclusion:** Gastroenterology fellows achieved an ADR slightly below the international standards, with an ADR of 23% among men and women  $\geq 50$  years, compared to 31.7% of attending physicians.

**Keywords:** Adenomas. Colonoscopy. Fellows. Polyps. Colorectal cancer.

### TDA en residentes de gastroenterología: estudio retrospectivo en una clínica de gastroenterología

#### Resumen

**Introducción y objetivos:** La tasa de detección de adenomas (TDA) es la presencia de al menos 1 adenoma en pacientes  $\geq 50$  años en colonoscopia de escrutinio. Cobra importancia por la asociación de adenomas con cáncer colorrectal. Se recomienda una TDA de 25% entre hombres y mujeres  $\geq 50$  años. Nuestro objetivo fue determinar la TDA en residentes de gastroenterología vs profesores. **Material y métodos:** Desarrollamos un estudio observacional, descriptivo y retrospectivo donde revisamos los expedientes de pacientes con colonoscopia en el periodo de 2 años. Se analizaron los datos demográficos, clínicos y la TDA de residentes vs profesores. **Resultados:** Evaluamos 363 procedimientos, 279 fueron realizados por residentes y 84 por los profesores. Se encontraron pólipos en 112 pacientes, la media de edad fue 58 años (17-90).

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La TDA para hombres y mujeres  $\geq 50$  años para residentes y profesores fue de 23% vs 31.7% ( $p = 0.18$ ) respectivamente, al dividirlo por género, en hombres fue 27.8% vs 44.8% ( $p = 0.08$ ) respectivamente, y en mujeres 19.1% vs 20.6% ( $p = 0.84$ ) respectivamente. **Conclusión:** Los residentes de gastroenterología mantuvieron una TDA ligeramente menor a los estándares internacionales, con una TDA de 23% entre hombres y mujeres  $\geq 50$  años, comparado con un 31.7% de los profesores.

**Palabras clave:** Adenomas. Colonoscopia. Residentes. Pólipos. Cáncer de colon.

## Introduction

The adenoma detection rate (ADR) has been associated with the quality of a colonoscopy, and it is one of the most important variables to achieve an adequate procedure<sup>1,2</sup>; this rate is defined as the presence of 1 or more adenoma lesions viewed on each patient above 50 years old that has a screening colonoscopy<sup>2,3</sup>. This becomes relevant as we know that this neoplasm predisposes to colorectal cancer, which is the 3<sup>rd</sup> and 2<sup>nd</sup> most common cancer worldwide in men and women, respectively<sup>4</sup>. In order to prevent it, they have to be removed<sup>5</sup>, that's why it is recommended to have at least 25% of ADR in men and women over 50 years old<sup>6</sup>. Despite this information, it has been seen that the ADR varies from 7.4 to 52.5%<sup>7</sup> and several variables affect this rate, such as bowel preparation, withdrawal time, and the endoscopist technique<sup>8-10</sup>.

In Mexico, there are poor data about the ADR of gastroenterology fellows, so we do not know if the quality of the colonoscopy is proper to the international standard. There are studies with surgery fellows that demonstrated having ADR from 31.8%<sup>11</sup> to 34.5%<sup>12</sup>, which are above the international standard. Furthermore, it has been described that for 1% of increase on ADR, the risk of colorectal cancer decreases 3%<sup>7</sup>, in order to improve this rate, there have been studies that implement endoscopic quality programs that increase the ADR from 36 to 47%<sup>8</sup>. In the evaluation of variability of ADR after adjustment, with respect to patients' gender and age, Jensen et al. found these adjusted rates are helpful only when there were wide differences in patients' demographics, such as gender and age, but when the patients' demographics were similar, this adjustment probably would not change the ADR<sup>13</sup>.

We made a descriptive and observational study to compare the ADR in gastroenterology fellows versus attending physicians, in order to know if the gastroenterology fellows have the international standard rate and if they have the same skill as attending physicians.

## Materials and methods

We perform a retrospective and descriptive study, where we reviewed the records of patients who attended the outpatient clinic of the Gastroenterology Service of the "Dr. José E. González" University Hospital who underwent a colonoscopy between July 2015 and July 2017. Information regarding the patient's age and gender, the doctor who made the procedure, the indication for the colonoscopy, the presence of polyps, and Boston scale<sup>14</sup> were collected. Boston scale was revised by the endoscopist, where 0 means unprepared colon segment with mucosa not seen because of solid stool, 1 for portion of mucosa seen, but other areas not well seen due to residual stool, 2 describes the minor amount of residual staining, but mucosa of colon seen well, and finally, 3 is for the entire mucosa of colon seen well with no residual staining. These were added and we determine a bad preparation for Boston scale from 0 to 3, a regular preparation from 4 to 6, and an excellent to very good colonic preparation from 7 to 9. All studies were performed using a colonoscope FUJI (EC-7602P-V/L).

The procedures were made by 10 attending physicians and 8 gastroenterology fellows, who were in their 2<sup>nd</sup> and 3<sup>rd</sup> years of training, all colonoscopies performed by fellows were supervised by an attending physician, and the preparation was made with a divided dose of 4 Liters of polietilenglicol. Patients with a history of polyps or cancer, colon surgery, anemia syndrome, and weight loss were excluded.

All the polyps were classified by size ( $< 1$  cm or  $\geq 1$  cm), shape (sessile, pediculate, and flat), location (right or left colon) in which the right colon was defined from the ascending colon to the transverse colon and the left colon was defined from the descending colon to the rectum, and eventually by histopathology (adenoma, no adenoma, adenocarcinoma and without polyp tissue). The authors declare that this article does not contain personal information to identify patients.

**Table 1.** General characteristics of the population studied

Variable	Global (n = 363)	Percentage	Fellows (n = 279)	Attending physicians (n = 84)
Mean age (years)	58 (17-90)	51.5%	57 (17-90)	61 (21-89)
Female	187	48.5%	143 (53.3)	44 (52.4%)
Male	176		136 (48.7)	40 (47.6%)
			p = 0.901	
Colonoscopy indication				
Abdominal symptoms	215	59.2%	166 (59.5%)	49 (58.3%)
Digestive tract bleeding	97	26.7%	87 (31.2%)	10 (11.9%)
Screening	46	12.7%	22 (7.9%)	24 (28.6%)
Diverticular disease	5	1.4%	4 (1.4%)	1 (1.2%)
			p < 0.001	
Colonic preparation				
Excellent to very good	241	66.3%	208 (74.6%)	33 (39%)
Good to moderate	47	12.9%	42 (15%)	5 (6%)
Bad	4	1.1%	3 (1.1%)	1 (1.2%)
Not registered	71	19.5%	26 (9.3%)	45 (53.6%)
			p < 0.001	
Withdrawal time			p = 0.531	
Medium minutes	11.3 (5-30)		10 (5-30)	10 (6-25)

## Statistical analysis

Statistical analysis was performed with SPSS Statistics Version 20.0 (Armonk, NY: IBM Corp). We analyzed the patients' baseline characteristics by using descriptive statistics (absolute values, percentages, means, and standard deviation). We determined the distribution of the variables with the Kolmogorov–Smirnov test. For comparative analysis between categorical variables, we used the  $\chi^2$  test and Student's *t*-test for continuous variables. We determined the odds ratio and 95% confidence interval of variables of interest.  $p < 0.05$  was considered statistically significant.

## Results

We evaluated 557 patients who underwent a colonoscopy; from this, we excluded patients with a history of polyps or cancer, colon surgery, anemia syndrome, and weight loss; we analyzed 363 procedures; 279 were made by fellows with strict supervision of an attending physician and 84 were made by attending physicians; 176 patients were men and 187 women. Polyps were found in 112 patients, and 64 (57.1%) were men and 48 (42.8%) were women; when analyzed by age  $\geq 50$  years, we registered 89 (79.4%) patients; from this, 52 (58.4%) were men and 37 (41.5%) were women. The mean age was 58 years old (17-90); based on Boston scale, 66.3% had an excellent to very good colonic preparation; the average procedure time was

11.39 min (Table 1). With respect to the indication of colonoscopy, the most prevalent was abdominal symptoms with a total of 59.2%.

The global ADR was 22.9% in general population and 25.1% in patients  $\geq 50$  years old; in relation to gender in patients  $\geq 50$  years old, 31.9% and 19.4% were for men and women, respectively. When we analyzed the fellows' ADR, it was found that for general population, they have 21.2% and 23% in patients  $\geq 50$  years (Table 2). The ADR for attending physicians was 28.6% in general population and 31.7% in patients  $\geq 50$  years, without statistical significance when compared with fellows ( $p = 0.16$  and  $p = 0.16$ , respectively) (Table 3). The ADR of fellows and attending physicians by gender and age  $\geq 50$  years was in men 27.8% versus 44.8% ( $p = 0.08$ ), respectively, and in women, we registered 19.1% versus 20.6% ( $p = 0.84$ ), respectively.

Polyps were classified by location as right or left colon (Table 4), and right colon registered 41 (36.6%) polyps; 37 (90.2%) were  $< 1$  cm and 4 (9.7%) were  $\geq 1$  cm; when we analyzed polyps by shape, we found 36 (87.8%) sessile, 4 pedicle, and 1 flat. On the other hand, the left colon registered 49 polyps (43.7%); 36 (73.4%) were  $< 1$  cm and 13 (26.5%) were  $\geq 1$  cm; the distribution by shape was 37 (75.5%) sessile, 9 pedicle, and 3 flat. On both sides, we registered 22 (19.6%) polyps; 18 (81.8%) were  $< 1$  cm and 4 (18.8%) were  $\geq 1$  cm; when we examined polyps by shape, we found 21 (95.4%) sessile and 1 pedicle. All polyps were biopsied and studied by the pathology department, reporting 1 case of adenocarcinoma.

**Table 2.** Polyp detection rate and adenoma detection rate in fellows

Variable	Polyp detection rate (%)		Adenoma detection rate (%)	
	All ages	≥ 50 years	All ages	≥ 50 years
Overall (n = 278)	29.5	32.3	21.2	23.0
Male	15.8	17.2	24.3	27.8
Female	13.7	15.2	18.3	19.1

**Table 3.** Polyp detection rate and adenoma detection rate in attending physicians

Variable	Polyp detection rate (%)		Adenoma detection rate (%)	
	All ages	≥ 50 years	All ages	≥ 50 years
Overall (n = 84)	38.8	41.5	28.6	31.7
Male	24.7	27.7	37.5	44.8
Female	14.1	13.8	20.5	20.6

**Table 4.** Polyp characteristics

Variable	All polyps (n = 112)			Polyps in ≥ 50 years (n = 89)		
	Right colon (n = 41)	Left colon (n = 49)	Both sides (n = 22)	Right colon (n = 33)	Left colon (n = 37)	Both sides (n = 19)
Gender						
Female	20 (48.78%)	19 (38.77%)	9 (40.90%)	16 (48.48%)	13 (35.13%)	8 (42.10%)
Male	21 (51.21%)	30 (61.22%)	13 (59.09%)	17 (51.51%)	24 (64.86%)	11 (57.89%)
Size						
< 1 cm	37 (90.24%)	36 (73.46%)	18 (81.81%)	30 (90.90%)	26 (70.27%)	15 (78.94%)
> 1 cm	4 (9.75%)	13 (26.53%)	4 (18.18%)	3 (9.09%)	11 (29.72%)	4 (21.05%)
Shape						
Sessile	36 (87.80%)	37 (75.51%)	21 (95.45%)	31 (93.93%)	28 (75.67%)	18 (94.73%)
Pedicle	4 (9.75%)	9 (18.36%)	1 (4.5%)	2 (6.06%)	6 (16.21%)	1 (5.26%)
Flat	1 (2.43%)	3 (6.12%)	0	0	3 (8.10%)	0
Histology						
Adenoma	28 (68.29%)	35 (71.42%)	19 (86.36%)	22 (66.66%)	27 (72.97%)	16 (84.21%)
No adenoma	7 (17.07%)	7 (14.28%)	2 (9.09%)	6 (18.18%)	6 (16.21%)	2 (10.52%)
Adenocarcinoma	0	1 (2.04%)	0	0	1 (2.70%)	0
No polyp	6 (14.63%)	6 (12.24%)	1 (4.54%)	5 (15.15%)	3 (8.10%)	1 (5.26%)

## Discussion

The ADR has been described to be at least 30% in men and 20% in women<sup>6</sup>; we found an overall ADR of 22.9% and 25.1% in patients ≥ 50 years. When analyzed the rate of fellows versus attending physicians in general population, the ADR was 21.2% versus 28.6% with no statistical significance ( $p = 0.16$ ), and so in patients ≥ 50 years, the ADR (23% vs. 31.7%) was not statistically significant ( $p = 0.16$ ). To our knowledge, our study is the only one in Mexico that reports the ADR of gastroenterology fellows with the strict supervision of

attending physicians and compares it with them, finding that this rate is 2% below the international standard<sup>6</sup>, besides that it was not statistically significant.

In this respect, in 2013, Oh et al.<sup>15</sup> directed a meta-analysis that reported studies comparing polyp detection by fellows with direct supervision of an attending physician versus attendings alone, finding a global ADR of 30.8%. The ADR for the group that involves fellows was 31.5% (95% CI: 26.7-36.2%), while the attendings alone had 30.4% (95% CI: 26.9-33.9%), with no statistical difference in both groups ( $p = 0.76$ ).

In a recent study by Aguilar et al., they found an ADR of 24.6%, made by Mexican endoscopists, but there were no fellows involved; this is really close to our data from gastroenterology fellows (23%)<sup>16</sup>.

In 2017, Chan et al.<sup>12</sup> conducted a study where they reviewed 25,749 colonoscopies from a prospectively collected database; from this, 14,168 (55%) were performed by attending physicians and the rest by fellows. They found an ADR of 33.5% for attending physicians and 34.5% for fellows, with no statistical significance ( $p = 0.09$ ). This suggests that fellows are capable to perform colonoscopies at the same level that attending physicians. In addition to this, Ortolani et al.<sup>11</sup> in 2016 directed a prospective study where 135 colonoscopies were performed by 5 surgery fellows after a structured endoscopy simulation curriculum and with the direct supervision of surgical endoscopists. They found an overall ADR of 31.8%, divided by gender it was found 38.7% and 26% for men and women.

Furthermore, in a retrospective study conducted by Buchner et al.<sup>17</sup> in 2011, they collected 2430 colonoscopies, 318 were made by fellows with supervising staff endoscopists and 2112 were performed by staff endoscopists without fellows. They analyzed the ADR founding that the procedures made by fellows versus those without them had a trend toward increased ADR (30% vs. 26%), even though it was not statistically significant ( $p = 0.11$ ); this is accord to our results since we did not find statistical significance with respect to the ADR of fellows (23%) versus attending physicians (31.7%) ( $p = 0.16$ ). In addition to this, they reported an increased ADR of small adenomas (< 5 mm) in colonoscopies made by fellows with supervision versus staff endoscopists (25% vs. 17%) with statistical significance ( $p = 0.001$ ).

In the majority of these studies, including ours, it is important to point out, that the presence of 2 physicians when the procedure is being carried out may be a variable that increases the ADR. This is mentioned in the study conducted by Rogart et al.<sup>18</sup> where they also found a rise on the ADR in colonoscopies made by fellows with the supervision of a gastroenterology attending, compared to procedures made by attendings alone (37% vs. 23%,  $p < 0.01$ ). This is one of the limitations in our study, also the number of procedures is not big enough, and the cohort is not a pure screening patient, but besides this, all the patients included were outpatients without alarm gastrointestinal symptoms.

Some studies recommended the implementation of different modalities of endoscopic quality improvement programs, which is still a controversial topic since some studies demonstrated a clear improvement when a

group of endoscopists with special training get better results in ADR compared with those without special training (EQUIP) (47% vs. 35%,  $p = 0.0013$ )<sup>8</sup>. Furthermore, another modality of quality improvement program based on the feedback of their procedures demonstrated a rise on the ADR from 30.5% to 37.7% ( $p = 0.003$ )<sup>19</sup>. Additionally, Kaminski et al. prove in their study that quality indicator feedback improves the ADR of 74.5% of the endoscopists<sup>20</sup>. On the other hand, Shaukat et al.<sup>21</sup> did not find significant improvement despite their systematic interventions. The importance of improving the ADR is because its improvement is associated with a decreased risk of interval colorectal cancer and death<sup>20</sup>.

Even though there is few information in this regard of the ADR for gastroenterology fellows, we have several limitations. We made a retrospective study, which could give less value to our results; Furthermore, in this respect, this could lead us to make a selection bias. In addition to this, our study was conducted only in one center, and this cannot be extrapolated to all gastroenterology fellows.

## Conclusion

Gastroenterology fellows accomplished an ADR slightly below the international standards, with an ADR of 23% among men and women  $\geq 50$  years, compared to 31.7% of attending physicians, which is above the required value. When divided by gender, it was found for fellows 27.8% and 19.1% for men and women  $\geq 50$  years, respectively, with no statistical significance with respect to attending physicians ADR for men ( $p = 0.08$ ) and women ( $p = 0.84$ )  $\geq 50$  years. There need to be prospective studies in order to prove fellow skills in colonoscopy; quality programs on colonoscopy have to be implemented during the trainee of gastroenterology fellows to improve the ADR.

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## Conflicts of interest

The authors declare to have no conflicts of interest.

## Ethical disclosures

**Protection of human and animal subjects.** The authors declare that no experiments were performed on humans or animals for this study.

**Confidentiality of data.** The authors declare that they have followed the protocols of their work center on the publication of patient data.

**Right to privacy and informed consent.** The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author is in possession of this document.

**Use of artificial intelligence for generating text.** The authors declare that they have not used any type of generative artificial intelligence for the writing of this manuscript, nor for the creation of images, graphics, tables, or their corresponding captions.

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