

# Indications, Yield and Outcome of Colonoscopy: A 7-Year Retrospective Study in a Resource-Limited Setting

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## Abstract

**Background and Aims:** Diagnostic colonoscopy allows exploration of the colonic mucosa. Indications are multiple. The purpose of this work was to describe the indications and to report the lesions observed during colonoscopy at the General Hospital of Douala. **Methods:** This was a cross-sectional study with retrospective data collection over a period of 7 years (January 1, 2010 to January 31, 2017). The data collected from the reports were socio-demographic characteristics, indications and lesions observed at colonoscopy. Binary logistic regression allowed us to identify the independent risk factors associated with the presence of tumors and polyps. **Results:** We included 719 exams. The main indications were rectorrhagia (29.5%), abdominal pain (25.9%) and constipation (17.8%). A colonic lesion was found in 60.1% of cases. A colorectal tumor accounted for 10.3% of cases. Factors independently associated with colonic tumor were complete colonoscopy (aOR: 0.167 95% CI [0.096 - 0.289],  $p < 0.001$ ), presence of abdominal or rectal mass (aOR: 13.390 95% CI [5.684 - 31.544],  $p < 0.001$ ) and weight loss (aOR: 5.143, 95% CI [2.450 - 10.797],  $p < 0.001$ ). **Conclusion:** The presence of weight loss, abdominal or rectal mass should motivate the realization of a complete colonoscopy in search of a colorectal tumor. The most observed lesions remain hemorrhoids, polyps and diverticulosis of the colon.

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## Keywords

Colonoscopy, Indications, Colorectal Tumor, Limited Resources, Cameroon

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### 1. Introduction

The incidence of organic colonic disease is increasing in sub-Saharan Africa [1]. Colonoscopy allows visualization of the entire colonic mucosa [2]. Over time, its practice is more and more necessary and improvements are made to increase its profitability [3]. It is the case of narrow band imaging, which is used in combination with magnesium-enhanced endoscopy to better define precancerous colonic lesions [4] [5]. Thus, colonoscopy is the reference examination of colon exploration for the diagnosis, detection and surveillance of the main colon diseases [6]. It is also an invasive and expensive examination [7]. It is therefore important to determine, among its indications, those which lead to the most frequent diagnosis of neoplastic lesions [8]. Several studies have evaluated the proportion of colonoscopy reporting abnormalities in a given population (cost-effectiveness). In Cameroon, the yield is 51.3% [9] and reaches 71.9% in Sudan [10]. The indications for colonoscopy are varied. These include rectorrhagia, abdominal pain, transit changes, weight loss and many other indications. The major advantage of colonoscopy is the ability to perform diagnostic procedures such as sampling. Worldwide, gastrointestinal hemorrhage is the main indication for colonoscopy [1] [9]-[14]. In Cameroon, the main indications for colonoscopy are rectorrhagia (30.9%), abdominal pain (29.4%), chronic diarrhea (11.8%), chronic constipation (8.7%) [9]. However, all these indications do not always lead to the detection of digestive lesions. Colorectal cancer being the most feared lesion especially found in the subjects of more than 50 years [15]. In view of the risk incurred by patients, the cost of colonoscopy and increasing demand, it seems necessary to limit the indications for colonoscopy. In Africa and Cameroon in particular, colonoscopy is increasingly practiced [1] [9] [13] [16] [17]. Our objective was therefore to evaluate the yield of colonoscopy in lower digestive pathology by describing the indications and outcome in the endoscopy unit of Douala General Hospital.

### 2. Methods

#### 1) Study design, study area and setting

We conducted a cross-sectional study over a period of 7 years, from January 1, 2010 to January 31, 2017 at the digestive endoscopy unit of Douala General Hospital, a first-class health facility in the health pyramid. It is also a university hospital and has a capacity of 320 beds. The hospital has amongst other units an endoscopy exploratory unit, a gastroenterology outpatient consultation unit and an internal medicine service for hospitalization. Four senior gastroenterologists performed explorations in this unit with a Fujinon EPX-2200 video endoscope

processor. Endoscopic examinations were performed by a video colonoscope Fujinon EC-201 WL. The disinfection procedure was performed manually according to the protocol of the French digestive endoscopy society [18]. Sedation was done with 10 mg of diazepam diluted in eight milliliters of saline and administered intravenously.

## 2) Data collection and analysis

Data was collected from the endoscopy reports. The following data were collected: age, sex, indication and lesions observed at colonoscopy.

All the colonoscopy reviews were included in this study. The yield of a colonoscopy was defined by its ability to highlight a particular lesion. Overall yield was determined by the number of colonoscopies revealing abnormalities compared to normal colonoscopies. It was considered complete any colonoscopy visualizing the colon until the caecum.

Data were analyzed using Statistical Package for Social Sciences 21.0. The results were expressed in numbers and percentages for the qualitative variables, mean and standard deviation for the quantitative variables. The chi-square test or the Fisher exact test was used for associations. The binary logistic regression allowed a multivariate analysis to find the factors independently associated with the significant lesions. Only factors associated with significant lesions in univariate analysis has been included in the logistic regression model to obtain adjusted odds ratio and p value. The threshold of significance was defined for a value  $p < 0.05$ .

Ethics and consent: All information collected during this work has been treated confidentially. Data collection was retrospective and informed consent was not required. This study was approved by the institutional ethics committee of Douala General Hospital.

## 3. Results

### 3.1. Population

We included 719 colonoscopy reports. The mean age was  $51.9 \pm 15.0$  years, with a range of 5 to 88 years and a sex ratio of 1.3. Subjects older than 50 years accounted for 61.6% of the population. Complete colonoscopies were reported in 76.7% of cases.

### 3.2. Indications for Colonoscopy

They have been grouped into three categories namely screening, monitoring and symptom evaluation. Rectorrhagia was the most common indication of colonoscopy accounting for 30% of the colonoscopies performed. **Table 1** summarizes the indications for colonoscopy.

### 3.3. Observed Lesions

No lesions were found in 40% of colonoscopies. The three most common lesions were hemorrhoids (17.1%), diverticulosis (16.4%) and polyps (11.4%). The

presence of colorectal tumor accounted for 10.3%.

The overall yield of the colonoscopy was 60.1%. **Table 2** summarizes the lesions observed at colonoscopy.

#### Factors associated with the presence of colorectal tumors

In univariate analysis the male gender (OR: 0.566, 95% CI [0.349 - 0.919]), performing a complete colonoscopy (OR: 0.184, 95% CI [0.111 - 0.302]), weight loss (OR: 3.317, 95% CI [1.713 - 6.421]) and the presence of an abdominal or rectal mass (OR: 8.537, 95% CI [4.011 - 18.170]) were significantly associated with the presence of a colorectal tumor. In binary logistic regression, the factors independently associated with the colorectal tumor were complete colonoscopy (adjusted OR: 0.167, 95% CI [0.096 - 0.289]), colorectal cancer surveillance (adjusted OR: 4.783, 95% CI [1.536 - 14.893]), weight loss (adjusted OR: 5.143 95% CI [2.450 - 10.797]) and abdominal or rectal mass (OR adjusted: 13.390 95% CI [5.684 - 31.544]). **Table 3** summarizes the factors associated with the presence of colorectal tumors.

**Table 1.** Indications for colonoscopy.

Indications	Numbers (n = 719)	Percentage (%)
Screening	16	2.2
Positive hemocult	10	1.4
Family history of colorectal cancer	6	0.8
Surveillance	36	5.0
Colorectal cancer surveillance	21	2.9
Polyp monitoring	8	1.1
Surveillance of ulcerative colitis	7	1.0
Symptom evaluation	661	92.7
Rectorrhagia	210	29.5
Abdominal pain	185	25.9
Constipation	127	17.8
Iron deficiency anemia	58	8.1
Weight loss	56	7.9
Diarrhea	39	5.5
Abdominal or rectal mass	31	4.3
Alternating diarrhea constipation	20	2.8
Proctalgia	20	2.8
Melena	13	1.8
Primary cancer foci search	12	1.7
Suspicion of CIBD	11	1.5
Other*	98	13.7
<b>Unspecified</b>	6	<0.1

\*: Abdominal bloating, cervical cancer assessment, functional colopathy, dyspepsia, hemorrhoidal disease, dysenteric syndrome.

**Table 2.** Lesions observed at colonoscopy.

Observed lesions	Numbers (n = 719)	Percentage (%)
No lesion	287	39.9
Hemorrhoids	123	17.1
Diverticulosis	118	16.4
Polyp	82	11.4
Colorectal tumor	74	10.3
Colitis	39	5.4
Proctitis	28	3.9
Rectal ulcer	11	1.5
Other*	55	7.6

\*: colonic angiodysplasia, dolichocolon, spasmodic colopathy, erythema colic, fistula, melanosis colic.

**Table 3.** Factors associated with the presence of colorectal tumor.

	Presence of colorectal tumor n (%)	Absence of colorectal tumor n (%)	Total n	OR (95% CI)	p-value	Adjusted OR (95% CI)	Adjusted p-value
Age ≥ 50 years	47 (10.9)	385 (89.1)	432	1.141 (0.688 - 1.891)	0.607		
Male	33 (8.0)	378 (92.0)	411	0.566 (0.349 - 0.919)	<b>0.021</b>	0.630 (0.368 - 1.080)	0.093
Complete colonoscopy	32 (5.8)	519 (92.4)	551	0.184 (0.111 - 0.302)	<b>&lt;0.001</b>	0.167 (0.096 - 0.289)	<b>&lt;0.001</b>
Screening							
Positive hemocult	1 (10.0)	9 (90.0)	10	0.959 (0.120 - 7.677)	1.000		
Family history of colorectal cancer	0 (0)	6 (100)	6	/	1.000		
Surveillance							
Colorectal cancer surveillance	5 (23.8)	16 (76.2)	21	2.822 (1.003 - 7.939)	<b>0.057</b>	4.783 (1.536 - 14.893)	<b>0.007</b>
Polyp monitoring	0 (0)	8 (100)	8	/	1.000		
Surveillance of ulcerative colitis	0 (0)	7 (100.0)	7	/	1.000		
Symptom evaluation							
Rectorrhagia	25 (11.9)	185 (88.1)	210	1.252 (0.751 - 2.087)	0.393		
Abdominal pain	15 (8.0)	173 (92.0)	188	0.685 (0.378 - 1.239)	0.197		
Constipation	11 (8.7)	116 (91.3)	127	0.787 (0.402 - 1.540)	0.475		
Iron deficiency anemia	5 (8.6)	53 (91.4)	58	0.801(0.310 - 2.072)	0.639		
Emaciation	14 (25.0)	42 (75.0)	56	<b>3.317</b> (1.713 - 6.421)	<b>0.001</b>	5.143 (2.450 - 10.797)	<b>&lt;0.001</b>
Diarrhea	6 (15.4)	33 (84.6)	39	1.620 (0.655 - 4.006)	0.280		
Abdominal or rectal mass	14 (45.2)	17 (54.8)	31	<b>8.537</b> (4.011 - 18.170)	<b>&lt;0.001</b>	13.390 (5.684 - 31.544)	<b>&lt;0.001</b>
Alternating diarrhea constipation	1 (5.0)	19 (95.0)	20	0.447 (0.059 - 3.388)	0.711		
Proctalgia	2 (10.0)	18 (90.0)	20	0.958 (0.218 - 4.215)	1.000		
Melena	1 (7.7)	12 (92.3)	13	0.716 (0.092 - 5.584)	1.000		

For polyps, univariate analysis revealed the following significantly associated factors: complete colonoscopy (OR: 2.360, 95% CI [1.189 - 4.684]), colorectal cancer surveillance (OR: 3.242 95% CI [1.221 - 8.606]), polyp (OR: 58.800, 95% CI [7.136 - 484.474]) and ulcerative colitis (OR: 5.953, 95% CI [1.308 - 27.084]) and diarrhea. In multivariate analysis, the factors independently associated with the presence of polyps were the same as those mentioned above with the exception of diarrhea. **Table 4** summarizes the factors associated with the presence of polyps.

#### 4. Discussion

The aim of this work was to evaluate the yield of colonoscopy in lower digestive pathology according to indications. We report the results of 719 colonoscopies

**Table 4.** Factors associated with the presence of polyps.

	Presence of polyp n (%)	Absence of polyp n (%)	Total n	OR (95% CI)	p value	Adjusted OR (95% CI)	Adjusted p value
Age ≥ 50 years	52 (12.0)	380 (88.0)	432	1.132 (0.699 - 1.834)	0.611		
Male	54 (13.1)	357 (86.9)	411	1.507 (0.930 - 2.442)	0.091		
Complete colonoscopy	72 (13.1)	479 (86.9)	551	2.360 (1.189 - 4.684)	<b>0.007</b>	2.099 (1.048 - 4.205)	<b>0.036</b>
Screening							
Positive hemocult	3 (30.0)	7 (70.0)	10	3.385 (0.858 - 13.357)	0.097		
Family history of colorectal cancer	1 (16.7)	5 (83.3)	6	1.546 (0.178 - 13.396)	0.521		
Surveillance							
Colorectal cancer surveillance	6 (28.6)	15 (71.4)	21	<b>3.242</b> (1.221 - 8.606)	<b>0.025</b>	3.632 (1.354 - 9.742)	<b>0.010</b>
Polyp monitoring	7 (87.5)	1 (12.5)	8	<b>58.800</b> (7.136 - 484.474)	<b>&lt;0.001</b>	56.255 (6.799 - 465.437)	<b>&lt;0.001</b>
Surveillance of ulcerative colitis	3 (42.9)	4 (57.1)	7	<b>5.953</b> (1.308 - 27.084)	<b>0.036</b>	6.652 (1.441 - 30.700)	<b>0.015</b>
Symptom evaluation							
Rectorrhagia	23 (11.0)	187 (89.0)	210	0.926 (0.555 - 1.543)	0.766		
Abdominal pain	16 (8.5)	172 (91.5)	188	0.647 (0.365 - 1.148)	0.124		
Constipation	17 (13.4)	110 (86.6)	127	1.239 (0.699 - 2.195)	0.470		
Iron deficiency anemia	5 (8.6)	53 (91.4)	58	0.708 (0.275 - 1.826)	0.457		
Weight loss	7 (12.5)	49 (87.5)	56	1.109 (0.485 - 2.536)	0.809		
Diarrhea	0 (0)	39 (100)	39	/	<b>0.016</b>		
Abdominal or rectal mass	2 (6.5)	29 (93.5)	31	0.519 (0.122 - 2.216)	0.565		
Alternating diarrhea constipation	1 (5.0)	19 (95.0)	20	0.398 (0.053 - 3.010)	0.718		
Proctalgia	0 (0)	20 (100)	20	/	0.152		
Melena	1 (7.7)	12 (92.3)	13	0.637 (0.082 - 4.962)	0.647		

performed in the digestive endoscopy unit of Douala General Hospital in Cameroon. These have made it possible to identify in 432 cases an injury, thus a yield of 60%. In a study conducted in the city of Yaoundé, Ankouane *et al.* reported a yield of 51.3% [9]. In Nigeria, it was 79.6% [13], in Senegal 61.9% [1]. In Europe, Exbrayat and Kmiecziak reported yield of 31.9% and 43%, respectively [6] [7]. These high rates generally in Africa reflect the fact that colonoscopies are most often performed in subjects already having digestive symptoms. However, the variations observed in the different values would be related to several factors such as the nature of the selected colonoscopies. Colonoscopy indications are varied and found in various proportions depending on the series. In ours, the most common were those related to the evaluation of digestive symptoms accounting for 92.7% of indications. Ankouane *et al.* found 90.1% of indications related to the evaluation of digestive symptoms. This rate is relatively low in the West, so Exbrayat *et al.* in a series of 1779 colonoscopies reported a proportion of 40% in this group of indications [7]. Screening in healthy subjects and coverage by insurance coverage in the West makes it possible and justify this disparity. The most common symptoms leading to colonoscopy were rectal bleeding (29.5%), abdominal pain (25.9%), constipation (17.8%), iron deficiency anemia (8.1%), weight loss (7.9%). In Yaoundé, it was mainly rectorrhagia (30.9%), abdominal pain (29.4%), chronic diarrhea (11.8%), chronic constipation (8.7%), iron deficiency anemia (3.0%) [9]. In Nigeria, Adegboyega *et al.* found rectorrhagia (34%), abdominal pain (18.4%), constipation (10.8%), diarrhea (8.8%) and changes in transit (3.6%) [12]. In America, Lieberman *et al.* found mainly rectal bleeding (33.6%) and symptoms suggestive of irritable bowel (23.8%) [11]. Digestive bleeding at the international level is the main indication of colonoscopy certainly because of the alarming nature of this sign for both the clinician and the patient. Screening was the indication for colonoscopy in 2.2% of cases in our series with 10 cases (1.4%) of positive blood cultures and 6 cases (0.8%) of family history of colorectal cancer. Ankouane *et al.* reported 3.1% of colonoscopies in this indication with 13 cases (1.4%) of positive blood cultures [9]. In Senegal, screening for colorectal cancer accounts for 2.65% of colonoscopy indications [1]. In Europe, Kmiecziak reported 22% colorectal cancer screening and in America, Lieberman reported 35.2% colorectal cancer screening [6] [11]. In sub-Saharan Africa, there are several barriers to access to care, mainly financial precariousness, the lack of information for subjects at risk of colorectal cancer. In addition, screening is very rare [1] [9]. This inequality also helps to understand the relatively high proportion of subjects over 50 in western series compared to African series [7] [9] [11] [13] [19] because it is established that colorectal cancer occurs mainly after age of 50 [15]. The colonic lesions monitoring accounted for 5% of our indications. In Yaoundé, it represented 2.9%, in Europe 22% and in America 21.7%.

## 5. Conclusion

The interest of the practice of colonoscopy in sub-Saharan Africa is essentially

focused on the evaluation of symptoms. It allows in significant proportions to highlight significant colonic lesions, namely colorectal tumors and polyps. The indications independently associated with the colorectal tumor are the completion of a complete colonoscopy, the presence of abdominal mass and weight loss. Therefore, the presence of weight loss, abdominal or rectal mass should motivate the realization of a complete colonoscopy in search of a colorectal tumor. The most observed lesions remain hemorrhoids, polyps and diverticulosis of the colon.

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### Contribution of Authors

Conception of the study: Gabin Ulrich Kenfack and S.A. Eloumou Bagnaka.

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All authors read and approved the final manuscript.

### Conflicts of Interest

Authors declare that they have no competing interests.

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