Profile of Patients Undergoing Colonoscopy at the San José del Carmen Regional Hospital in Copiapó, Chile, 2022–2024

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Abstract

Objectives: To describe the cohort of patients undergoing colonoscopies performed between 2022 and 2024 at the Regional Hospital of Copiapó, with an emphasis on colorectal cancer.

Materials and Methods: A quantitative, cross-sectional, and descriptive study was conducted using data obtained from the databases of the Statistics Department and the Pathology Department of the Regional Hospital of Copiapó (HRC).

Results: Between 2022 and 2024, a total of 1,136 complete colonoscopies were scheduled; 1,114 were completed, 18 were canceled, and 4 were incomplete, with a steady annual increase in the total number of procedures performed. The main reason for cancellation was patient no-show. Women and beneficiaries of the National Health Fund (FONASA) predominated, and the most frequent age groups were 60–69 and 70–79 years. Most indica-

tions originated from the Diagnostic and Treatment Center (CDT) and the gastroenterology specialty. A total of 644 biopsies were obtained, a number that also showed a progressive increase. Histological findings were mainly distributed between adenomas and colitis, which together accounted for ≥60% of annual results, while cancer remained ≤10%, decreasing from 9.9% in 2022 to 5.4% in 2024.

Conclusions: The study showed a sustained increase in colonoscopies and biopsies performed at the Copiapó Hospital between 2022 and 2024. The most frequent diagnoses were adenomas and colitis, with a progressive increase in adenomas, suggesting improved early detection. These findings highlight the need to strengthen screening strategies and timely access to care, providing key inputs for regional healthcare planning.

Keywords: colonoscopy; adenoma; colorectal neoplasms; epidemiology; Chile

Introduction

Colonoscopy is an endoscopic procedure that allows direct visualization of the colon and rectum. Its purpose is to detect lesions such as ulcers, polyps, and cancer, as well as to enable biopsy sampling for histopathological analysis. It is currently the diagnostic method of choice for most colorectal diseases and a key tool in the prevention and early detection of colorectal cancer (CRC).

CRC is a multifactorial malignant neoplasm affecting the large intestine and/or rectum. It is the third most common cancer worldwide, accounting for 10% of all cases (1), and the second leading cause of cancer-related death (2). Its incidence is higher in individuals over 50 years of age, with a predominance in males (2).

Despite the fact that early diagnosis improves prognosis, CRC often presents with nonspecific symptoms in its early stages, making early detection difficult. Consequently, it is frequently diagnosed at advanced stages, when therapeutic options are limited. In its metastatic form, it has a high lethality rate, with a five-year survival rate of approximately 14% (3,4).

Chile is a geographically extensive and diverse country, ranging from the driest desert in the north to temperate forests and subantarctic regions in the south. This ecological heterogeneity translates into disparities in healthcare access, resource distribution, quality of life, and environmental exposure, which in turn impact the frequency, diagnosis, and management of diseases (5,6).

The Atacama Region faces multiple geographic and structural barriers. Limited high-complexity healthcare infrastructure outside the regional capital, along with access difficulties in several municipalities, compromises timely disease detection (5). These conditions contribute to underreporting and hinder the understanding of the local behavior of this pathology.

The San José del Carmen Regional Hospital of Copiapó (HRC), located in the regional capital, is the only high-complexity healthcare center in Atacama (7). Due to its central role, it is the main public institution responsible for performing diagnostic procedures for the detection and follow-up of CRC.

In Chile, CRC incidence and mortality have steadily increased between 2000 and 2016, according to data from the Department of Health Statistics and Information (DEIS) (3). In the Atacama Region, 246 deaths from colon cancer and 83 deaths from rectal cancer were recorded between 2011 and 2021, based on the most recent available DEIS data.

In this context, the present study aims to determine the annual trend of disease diagnoses detected through colonoscopy between 2022 and 2024 in the Atacama Region, in order to update the epidemiological status of the region and understand how these diseases affect its residents. Accordingly, the following research question is proposed: What is the epidemiological profile of individuals residing in the Atacama Region who underwent colonoscopy between 2022 and 2024?

Materials and Methods

A quantitative, cross-sectional, and descriptive study was conducted using data obtained from the databases of the Statistics Department and the Pathology Department of the HRC. These databases included the following variables: procedure date, sex, age, health insurance status, clinical history, biopsy location, histopathological findings, funding source, referral origin, and requesting specialty.

The records were analyzed with the aim of normalizing the data, standardizing terminology, quantifying variables, and generating tables and graphs. During the analysis, considerable heterogeneity in data recording was identified, requiring manual standardization under unified categories. Additionally, some missing data were detected and coded as “no record” or “unspecified” to avoid bias derived from assumptions.

The purpose of terminology standardization was to ensure comparability, reduce semantic ambiguity, minimize data loss due to discrepancies in nomenclature, and produce a cleaned database that would allow for robust statistical analysis of the variables studied.

To achieve this, standardized terms were established (see Table 1). For example, the term "ascending" was used to refer to "Asc," "Ascending," "ascending colon," "right colon," and similar variants. Furthermore, certain terms were grouped into broader categories: the category "cancer" included adenocarcinoma and carcinoma; "polyp" included sessile lesion, polyp, and polyps; and "colitis" included colitis, proctitis, inflammatory bowel disease (IBD), and inflammation. These groupings were based on semantic and clinical equivalence, established through review and consensus among the researchers, considering the terminology used in the original records and its correspondence with standardized diagnostic categories.

Table 1. Data normalization

Term	Equivalents
Colon	large intestine
Ascending	Ascending
	Asc
	Ascending colon
	Right colon
	Rgt colon
Descending	Descending
	Descending colon
	C. Descending
	Descending colon mucosa
	Left colon
	Lft colon
Sigmoids	Sigmoids
	sigmoid colon
	C. sigmoid
	sigmoid colon mucosa
	sigmoid mucosa
	Sigmoids
Rectum	Rectum
	rectal mucosa
	mucosa rectal
	rectal blister
	rectocolitis
	ulcerative rectocolitis
Colorectal	rectum and sigmoid
	rectum and sigmoid colon
Blind	blind
	cecal
Neoplasia	Neo
	NEO
	Neoplasa
Cancer	Ca
	CA
	Cancer
Tumor	Tu
	TU
	Tumor

Term	Equivalents
Hemorrhage	blood in stool
Irritable bowel syndrome	IBS
Inflammatory bowel disease	IBD
	Inflammatory bowel disease
Chagas disease	Chagas
	Chagas disease
Colorectal mucosa	
Chemotherapy	CT
Radiation therapy	RDT
Ulcerative colitis	UC
Normal	Within histological limits
	Preserved architecture
	No lesions
Diverticulitis	Acute diverticula
Peripheral arterial disease	PAD
Primary biliary cirrhosis	Cirrhosis PB
	PBC
Gastroesophageal reflux disease	GERD
Upper gastrointestinal bleeding	UGIB
Disease	Dis
	Disease
Syndrome	Sdr
Chronic kidney disease	CKD
Metastasis	MT
	Metastasis
On hemodialysis	OHD
No record	When there is no data
	when it is not specified
Chronic liver damage	CLD
	OIS
Stenosing lesion	Stenosis
Anastomosis	Anastomotic mucosa
	Distal anastomotic cuff
Lower gastrointestinal bleeding	LGIB

Source: Own elaboration based on data collected by the Department of Pathological Anatomy of the HRC.

Results

During the 2022–2024 period, a total of 1,136 full colonoscopies were scheduled (including sigmoidoscopy and left-sided colonoscopy). Of these, 1,114 were successfully completed (98.1%), 18 were canceled (1.6%), and 4 were incomplete (0.3%). In 2022, 358 procedures were performed, with 18 cancellations and 3 incomplete cases; in 2023, 381 procedures were performed, with 1 incomplete case; and in 2024, 397 colonoscopies were completed. Across these three years, a progressive increase in the number of procedures performed annually was observed.

The most frequent cause of procedure cancellation was patient no-show (44.4%), followed by inadequate bowel preparation (22.2%). Other less frequent reasons included patient refusal and physician decision, among others.

The months with the highest number of colonoscopies were May (129; 11.4%), March (127; 11.2%), June (121; 10.7%), and December (110; 9.7%). In contrast, the lowest activity was observed in January (73; 6.4%), February (66; 5.8%), and September (61; 5.4%). In 2022, the highest number of biopsies was recorded in May; in 2023, in March; and in 2024, in June. Conversely, the lowest number of procedures occurred in February in both 2022 and 2024, and in July in 2023.

Of the total procedures, 637 (56.1%) were performed in women and 499 (43.9%) in men, showing a higher proportion of female patients undergoing this examination. In 2022, 165 procedures were performed in men and 193 in women; in 2023, 174 in men and 207 in women; and in 2024, 160 in men and 237 in women, the year with the largest gap between sexes. While the male group showed a slight increase between 2022 and 2023 followed by a decrease in 2024, the female group maintained a steady upward trend.

During the study period, most procedures were concentrated in the 60–69 age group (278; 24.5%), followed by 70–79 years (270; 23.8%), 50–59 years (227; 20%), and 40–49 years (136; 12%). Consistent with overall data, 2022 and 2024 showed the same trend. In 2023, most procedures were performed in the 70–79 age group (99; 26%), followed by 60–69 (94; 24.7%), 50–59 (79; 20.7%), and 40–49 (42; 11%).

A marked concentration of procedures was observed among patients affiliated with the National Health Fund (FONASA), who accounted for 98.6% of the total, with 1,120 colonoscopies performed. In contrast, participation of patients with other types of insurance was considerably lower: 4 pro-

cedures in beneficiaries of Private Health Insurance Institutions (ISAPRE) (0.35%); 4 in users of the Comprehensive Health Care and Reparation Program (PRAIS) (0.35%); 3 in affiliates of the Chilean Police Health System (DIPRECA) (0.26%); and 5 procedures in private-pay patients (0.44%).

Regarding the source of referral or indication for the procedure, the Diagnostic and Treatment Center (CDT) was the main source, with a total of 871 colonoscopies, representing 76.7% of procedures scheduled during the study period. Hospitalized patients accounted for 242 procedures (21.3%). Referrals from emergency services (14; 1.2%), primary healthcare (PHC) (5; 0.4%), and other sources—including home care (2; 0.2%) and unspecified origins (2; 0.2%)—represented a smaller proportion.

With respect to the medical specialty responsible for the indication, gastroenterology was the leading source, with 657 colonoscopies (57.8%), followed by general surgery with 387 indications (34.1%). Other specialties contributed to a lesser extent, including internal medicine (52; 4.6%), general practitioners (31; 2.7%), and adult pulmonology (9; 0.8%).

During the study period, the primary source of funding for colonoscopies was institutional resources; that is, procedures performed by hospital-employed physicians within their regular working hours and without external funding accounted for 711 procedures (62.6%). The "33,000 Hours Program," an initiative aimed at reducing waiting lists through additional specialist services, funded 218 procedures (19.2%) during 2022 and 2023. Finally, outsourced services—where the hospital contracts external specialists—accounted for 207 colonoscopies (18.2%), with a progressive increase toward the end of the study period.

A total of 644 biopsies were collected from colonoscopies performed at the same institution. Figure 1 shows the annual distribution of samples: 144 (22.4%) in 2022, 204 (31.7%) in 2023, and 296 (46%) in 2024, with the highest number recorded in the latter year.

Figure 1. Number of colonoscopies with biopsies during 2022–2024, by sex.

Gender	Frequency (n)			Percentage (%)		
	Year 2022	Year 2023	Year 2024	Year 2022	Year 2023	Year 2024
Female	75	114	176	52,1%	55,9%	59,5%
Male	69	90	120	47,9%	44,1%	40,5%

Source. Own elaboration based on data collected by the Department of Pathological Anatomy of the HRC.

The months with the highest number of colonoscopies with biopsy sampling were March (86; 13.4%), November (73; 11.4%), and December (66; 10.3%). In contrast, the lowest activity was observed in February (33; 5.2%), June (39; 6.1%), and September (31; 4.8%). When analyzing monthly variation, some interannual variability is evident. In 2022, the highest number of biopsies was recorded in July, whereas in 2023 and 2024, March showed the highest figures in both years. Conversely, the lowest number of procedures occurred in February in 2022 and 2024, and in September in 2023.

Of the total procedures, 365 (56.7%) corresponded to women and 279 (43.3%) to men, indicating a higher proportion of female patients undergoing biopsy during colonoscopy. In 2022, 69 biopsies were performed in men and 75 in women; in 2023, 90 in men and 114 in women; and in 2024, 120 in men compared to 176 in women. A steady increase was observed in both groups throughout the study period, although with a consistent predominance of females, which became more pronounced in the final year analyzed.

Figure 2 shows that most biopsies were concentrated in the 60–69 age group (160; 24.8%), followed by 70–79 years (159; 24.7%), 50–59 years (127; 19.7%), and 40–49 years (60; 9.3%). In 2022 and 2023, the age group with the highest number of biopsies was 70–79 years, whereas in 2024 it was the 60–69 age group. During the study period, an increase in the number of biopsies was observed in the 30–39 age group in 2023 and 2024, and in the 80–89 age group in 2022 and 2024.

Figure 2. Number of colonoscopies with biopsies during 2022–2024, by age group.

Age	Frequency (n)			Percentage (%)		
	Year 2022	Year 2023	Year 2024	Year 2022	Year 2023	Year 2024
0-9	0	1	0	0%	0,5%	0%
10 - 19	3	1	1	2,1%	0,5%	0,3%
20 - 29	6	8	12	4,2%	3,9%	4,1%
30 - 39	7	17	22	4,9%	8,3%	7,4%
40 - 49	19	16	25	13,2%	7,8%	8,4%
50 - 59	28	39	60	19,4%	19,1%	20,3%
60 - 69	31	50	79	21,5%	24,5%	26,7%
70 - 79	33	59	67	22,9%	28,9%	22,6%
80 - 89	16	11	26	11,1%	5,4%	8,8%
90 - 99	1	2	4	0,7%	1%	1,4%

Source. Own elaboration based on data collected by the Department of Pathological Anatomy of the HRC.

Regarding clinical history, in 2022 the most common indications were polyp (52; 21.8%), lesion (32; 13.4%), colitis (29; 12.1%), adenoma (23; 9.6%), lower gastrointestinal bleeding (LGIB) (20; 8.4%), cancer (13; 5.4%), and diarrhea (12; 5%), which represented the main reasons for biopsy. The least common indications were anemia and diverticulosis (both 4; 1.7% each), irritable bowel syndrome (IBS) (6; 2.5%), suspected colitis (7; 2.9%), neoplasm and tumor (both 10; 4.2% each), and "others" (17; 7.1%), which included less frequent conditions such as Chagas disease, hemorrhoids, ileitis, chemotherapy, fecal occult blood (FOB), suspected cancer, and unspecified cases, among others.

In 2023, the most frequent clinical histories were polyp (81; 25.6%), colitis (45; 14.2%), adenoma (41; 13%), lesion (32; 10.1%), lower gastrointestinal bleeding (LGIB) (29; 9.2%), and cancer (27; 8.5%). The least frequent were diverticulosis and ileitis (both 3; 0.9% each), diverticulitis (4; 1.3%), irritable bowel syndrome (IBS) (6; 1.9%), diarrhea (7; 2.2%), neoplasm (9; 2.8%), and "others" (13; 4.1%), which included less common conditions such as Chagas disease, cirrhosis, chronic liver disease (CLD), nodular ileus, immunosuppression, obstruction, ostomy, weight loss, and pseudopolyp.

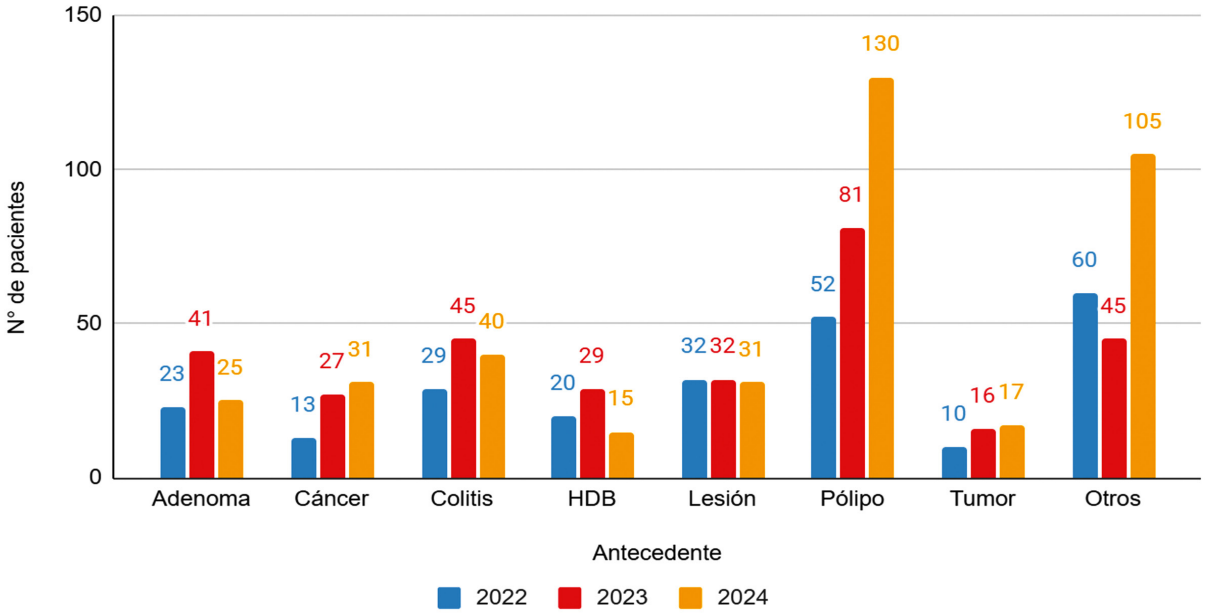
In 2024, the most common clinical histories were polyp (130; 32.5%), colitis (40; 10%), cancer and lesion (both 31; 7.8% each), and adenoma (25; 6.3%). In contrast, the least frequent were suspected cancer and suspected colitis (both 5; 1.3% each), systemic diseases, structural abnormalities, anemia, and unspecified cases (6; 1.5% each), as well as diarrhea, diverticulosis, and neoplasm (9; 2.3% each). Figures 3 and 4 present the most frequent clinical histories by year.

Figure 3. Number of colonoscopies with biopsies during 2022–2024, by clinical history.

Background	Frequency (n)			Percentage (%)		
	Year 2022	Year 2023	Year 2024	Year 2022	Year 2023	Year 2024
Adenoma	23	41	25	9,6%	13%	6,3%
Cancer	13	27	31	5,4%	8,5%	7,8%
Colitis	29	45	40	10,9%	14,2%	10%
HDB	20	29	15	8,4%	9,2%	3,8%
Lesion	32	32	31	13,4%	10,1%	7,8%
Polyp	52	81	130	21,8%	25,6%	32,5%

Source. Own elaboration based on data collected by the Department of Pathological Anatomy of the HRC.

Figure 4. Colonoscopies with biopsies according to clinical history in the years 2022, 2023, and 2024.



Source. Own elaboration based on data collected by the Department of Pathological Anatomy of the HRC.

Regarding histopathological findings, in 2022 the most common diagnoses were colitis (66; 34.6%) and adenoma (60; 31.4%), which together accounted for more than half of the results obtained. Other frequent findings included polyp (23; 12%), cancer (19; 9.9%), and lesion (12; 6.3%). Less frequent diagnoses included neoplasm and pseudopolyp (both 2; 1% each), ileitis (4; 2.1%), and "others" (3; 1.6%), which grouped findings such as normal results, periappendicitis, among others. Overall, adenoma and colitis diagnoses represented 66% of the total recorded results.

In 2023, the most frequent diagnoses were adenoma (90; 32.1%), colitis (79; 28.2%), polyp (49; 17.5%), cancer (24; 8.6%), lesion (19; 6.8%), and ileitis (14; 5%). Together, adenoma and colitis accounted for 60.3% of the total recorded results. Less common diagnoses included neoplasm (2; 0.7%) and "others" (3; 1.1%), which comprised conditions such as lower gastrointestinal bleeding (LGIB), pseudopolyp, and tumor.

In 2024, the most frequent diagnoses were adenoma (146; 37.2%), colitis (98; 25%), polyp (86; 21.9%), lesion (21; 5.4%), and cancer (21; 5.4%). Combined, adenoma and colitis diagnoses accounted for 62.2% of the total recorded results. Less frequent diagnoses included normal findings (5; 1.3%) and "others" (8; 2%), which grouped findings such as nonspecific changes and melanosis coli, among others.

Figure 5. Number of colonoscopies with biopsies during 2022–2024, according to biopsy results.

Results	Frequency (n)			Percentage (%)		
	Year 2022	Year 2023	Year 2024	Year 2022	Year 2023	Year 2024
Adenoma	60	90	146	31,4%	32,1%	37,2%
Cancer	19	24	21	9,9%	8,6%	5,4%
Colitis	66	79	98	34,6%	28,2%	25%
Lesion	12	19	21	6,3%	6,8%	5,4%
Polyp	23	49	86	12%	17,5%	21,9%

Source. Own elaboration based on data collected by the Department of P athological Anatomy of the HRC.

It is noteworthy that the most frequent age group in 2022 and 2023 was 70–79 years, while in 2024 it was 60–69 years. The most common clinical history was polyp, remaining consistent over the three-year period. Regarding biopsy results, colitis predominated in 2022, whereas adenoma was the most frequent finding in 2023 and 2024.

Discussion

Prior to the analysis of results, a data cleaning and standardization process was conducted, requiring multiple review sessions. This process highlighted deficiencies in the standardization of free-text variables, lack of interoperability between data recording systems, and limited oversight of data quality (8,9).

During the 2022–2024 period, a progressive increase in the number of colonoscopies performed annually was observed, reaching a completion rate of 98% of scheduled procedures. This increase may be associated with the end of the COVID-19 health emergency; however, further analysis is needed to determine whether it is proportional to clinical demand or sufficient to reduce waiting lists.

Although the most frequent cause of procedure cancellation was patient no-show, inadequate bowel preparation emerged as a relevant factor, likely related to poor adherence to instructions and difficulties in patient understanding. It is also important to consider the role of the healthcare team in this context, as—even though less frequent—these factors continue to contribute to the loss of clinical slots. Strengthening pre-procedure education and improving communication between healthcare providers and patients are therefore recommended.

Regarding procedure funding, a high reliance on institutional resources was observed. The remainder corresponded to special initiatives such as the "33,000 Hours Program" (10) and outsourced services, indicating a marked dependence on external funding sources. This aspect warrants further analysis to move toward a more sustainable model over time.

Despite reinforcement efforts, the analysis of monthly distribution revealed a decrease in colonoscopies during January, February, and September, which may be associated with reduced staffing during the summer period. Strengthening workforce availability during these months is suggested to ensure continuity of care.

Considering the epidemiology of CRC, promoting participation of men in colonoscopy screening is recommended, as they represent a higher-risk group (11,12). On the other hand, most colonoscopies and biopsies were performed in patients older than 60 years, supporting the targeting of screening programs in this age group.

Most patients were beneficiaries of the public health system (FONASA), and a large proportion of referrals originated from the Diagnostic and Treatment Center (CDT), reflecting the predominant sociodemographic profile of the hospital's population. The limited representation of patients from private insurance systems (ISAPRE) or other schemes prevents a comprehensive epidemiological characterization of colonoscopies in the region, as these patients are mainly treated in private institutions. This may lead to underestimation of the true burden of colorectal diseases; therefore, these factors should be considered when interpreting prevalence and planning screening and control strategies.

Most referrals came from gastroenterology and general surgery, reflecting their key role in the management of colorectal diseases. Given the shortage of specialists, strengthening the role of general practitioners as the first level of detection is recommended, which could help streamline disease screening. Future research could evaluate how many CRC cases are referred from primary healthcare (PHC) versus specialists, considering access barriers and waiting times.

Of the 1,114 colonoscopies performed during the study period, 644 biopsies were obtained, showing a steady increase in the number of analyzed samples, consistent with the overall rise in endoscopic procedures. This finding highlights the importance of biopsy sampling as a fundamental tool for accurate diagnosis and clinical decision-making.

From a histopathological perspective, biopsies were primarily requested based on clinical histories such as polyps, colitis, adenomas, lower gastrointestinal bleeding (LGIB), and other lesions, suggesting appropriate targeting toward potentially neoplastic conditions. These clinical findings correlated with histopathological diagnoses, where adenomas and colitis were the most frequent entities (13). LGIB was associated with vascular or inflammatory lesions, while histories of polyps and chronic abdominal pain were linked to adenomas and colitis. Furthermore, the recurrent finding of chronic colitis in younger patients or those with persistent symptoms may raise suspicion of early-stage inflammatory bowel disease (IBD), warranting specialized follow-up (14,15).

Adenomas and, more recently, hyperplastic polyps have been recognized as premalignant lesions involved in colorectal carcinogenesis, accounting for up to 30% of cancers (16,17). This reinforces the importance of early detection and follow-up. During the study period, 64 biopsies with cancer were identified, predominantly adenocarcinoma.

The detection of cancer in patients presenting with symptoms such as chronic anemia or lower gastrointestinal bleeding underscores the clinical value of symptom-based diagnosis. However, cases without evident clinical history were also observed, highlighting the importance of maintaining systematic screening programs even in asymptomatic individuals.

In summary, the relationship between clinical history and histopathological findings observed in this study supports current clinical criteria for indicating colonic biopsies. This association not only reinforces the effectiveness of colonoscopy as a diagnostic tool but also underscores the importance of integrating clinical, endoscopic, and histological findings for more accurate and personalized decision-making.

Conclusions

This study allowed for the characterization of the profile of patients undergoing colonoscopy at the HRC between 2022 and 2024, demonstrating a sustained increase in the performance of this procedure, particularly during 2024. A higher participation of patients affiliated with the National Health Fund (FONASA) was observed, with a predominance of women and older adults, especially those aged 60–79 years, who represented the most frequently treated groups.

Regarding histopathological findings, adenoma and colitis diagnoses predominated, accounting for more than 60% of biopsy results across the three

years analyzed. Notably, the frequency of adenomas showed a progressive increase, reaching its highest value in 2024, which may reflect improved detection of precursor lesions of colorectal cancer (CRC). On the other hand, although the presence of cancer remained relatively stable, its proportion slightly decreased in 2024, which could be interpreted as an opportunity for earlier detection.

These findings highlight the need to strengthen screening and timely diagnosis strategies, ensuring equitable access, particularly for high-risk groups. This information also provides valuable input for local healthcare planning, helping to guide resource allocation toward early detection of CRC and other gastrointestinal diseases.

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