

ORIGINAL ARTICLE

HIGHLIGHTS

- The text highlights the importance of effective colorectal cancer (CRC) screening methods that are cost-effective, safe, and acceptable to both professionals and patients.
- It categorizes screening methods into stool-based tests and visual examinations according to the American Cancer Society (ACS).
- Stool-based tests, particularly FIT, are favored due to their higher sensitivity. Recommendations for screening frequency are discussed, as well as genetic testing for those with a family history of CRC. The text emphasizes the positive impact of CRC screening on reducing incidence and mortality rates, the need for tailored screening programs, and the crucial role of early diagnosis in improving survival rates.

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Analysis of the tracking initiatives of colorectal cancer in Brazil

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ABSTRACT – Background – Colorectal cancer (CRC) is an important public health problem, as it represents the world's third most diagnosed neoplasm and the fourth cause of mortality. Its prevention can be divided into primary, secondary, demonstrated by tracking techniques, and tertiary, which consists of cancer diagnosis in symptomatic patients. Despite presenting a high incidence, the mortality rates decreased in the past two decades in developed countries, while the opposite happened in underdeveloped countries. That is attributed to the increase of colorectal cancer tracking programs in developed countries, which allows the precocious diagnosis and treatment of precancerous injuries and CRC. In that manner, the American Cancer Society divides the secondary tracking methods in exams based on feces samples and visual analysis of the colon and rectum, indicating its initiation starting at 45 years old in lower-risk patients. **Objective** – Verify in an analytical way the actions of colorectal cancer tracking held in Brazil, as to evaluate the necessity of implementation of a national tracking program of CRC. **Methods** – The methodology was based on a descriptive-quantitative secondary study that correlated the incidence of CRC, its morbidity and mortality, and the impact of the precocious tracking programs. It included activities not reported in medical literature through personal contacts with coordinators of regional programs to compare with the existent data in the literature. It was used as a variable for the tracking strategies the exams held, and their respective results. **Results** – It described nine programs held in different regions in Brazil, using two screening methods for CRC: a noninvasive method that consists of the research of blood hidden in feces, being the majority through the FIT method, and an invasive method, having the colonoscopy as its representant. These initiatives were effective in the detection of early forms of this disease. **Conclusion** – Despite the existence of several private tracking programs and the broad divulgation of the importance of the tracking and the early diagnosis of colorectal cancer, it was demonstrated that Brazil lacks a national program that patronizes the tracking methods, which reflects in the major prevalence of late diagnosis in the population.

Keywords – Colorectal cancer; Brazil; prevention; triage.

INTRODUCTION

According to the National Cancer Institute, in Brazil, colorectal cancer (CRC) contributes to a considerable extent to mortality in the country and represents the second most frequent neoplasm, in which the regions South and Southeast are the locations with more incidence⁽¹⁾ (Silva et al., 2020). However, these are the regions in which are concentrated the health services that compose the high complexity net, which favors the early treatment and influences the survival of patients⁽²⁾ (Dutra et al., 2018)⁽³⁾ (Liang et al., 2016). The major CRC incidence is associated with the lifestyle of the population, having as risk factors smoking, alcoholism, as well as sedentarism, and inadequate alimentation⁽⁴⁾ (Oliveira et al., 2018). The prevention of this morbidity in its primary form aims at the control of the risk factors. In the secondary level, it uses tracking techniques, whilst the tertiary consists of the diagnosis of cancer in symptomatic patients⁽⁵⁾ (Santos Junior, 2007)⁽⁶⁾ (SBCO, 2023).

The colonoscopy is of high excellence for the populational tracking, however, due to the complexity of the exam, it is not the reality in many countries, including Brazil. Therefore, the strategy is to perform the testing of occult blood found in feces, and only those patients with positive results are referred to colonoscopy⁽⁷⁾ (ACS, 2023). The Brazilian Society of Coloproctology⁽⁸⁾ (SBCP), the Brazilian Society of Endoscopy (SOBED), and the INCA (National Institute of Cancer)⁽⁹⁾ recommend tracking starting at the age of 50 through annual research of occult blood in feces and colonoscopy every 10 years. This is because approximately 95% of CRC cases arise from a pre-malignant stage, mostly asymptomatic, allowing for early detection and prevention through tumor resection before it progresses to adenoma-carcinoma⁽¹⁰⁾ (Assis, 2011)⁽¹¹⁾; (Averbach, 2020)⁽¹²⁾; (Gomes, 2013). Despite the existence of a few privately initiated programs and recommendations from Brazilian societies of coloproctology and endoscopy, Brazil lacks consensus regarding the implementation of tracking programs for this type of cancer⁽⁴⁾ (Oliveira et al., 2018).

Thus, the objective of this study is to analytically assess the actions of colorectal cancer screening performed in different regions of Brazil in order to evaluate the need for implementing a national CRC screening program⁽⁸⁾ (SBCP, 2023).

METHODS

The methodology was based on a descriptive quantitative secondary study that correlated the incidence of CRC and its morbidity and mortality with the impact of early screening programs. To do so, activities not reported in the medical literature were included through personal contacts with coordinators of regional programs, in order to compare them with the existing data in the literature. Thus, results from nine colorectal cancer tracking initiatives in Brazil were selected, and the respective tracking strategies, performed tests, and their results were considered as variables.

To contribute to the discussion by comparing with other countries, articles from the PUBMED and SCIELO platforms were analyzed using the keywords colorectal cancer, triage, prevention, and Brazil, considering both Portuguese and English languages. Therefore, this research considered articles published in indexed magazines, information from the federal government, recommendations from medical societies, as well as the aforementioned tracking activities not published in the medical literature. Other articles that did not correspond to the objectives of the study were excluded based on the title and abstract readings.

Data analysis was performed using Microsoft Excel, examining the percentages obtained in the survey, and the observed results were presented in the form of tables and figures.

RESULTS

The Senate Plenary approved Bill 5,024/2019, which designates March as the month of colorectal cancer (CCR) awareness, promoting the Blue March campaign. To strengthen this initiative, several engaged medical societies have carried out various activities. For example, the Brazilian Society of Endoscopy (SOBED) organized a colorectal cancer screening marathon in Piranhas (AL) in 2020. In March 2022, in collaboration with the Brazilian Society of Coloproctology (SBCP), similar events took place in Pilar (AL) and Belterra (PA). More recently, in 2023, in partnership with the Brazilian Federation of Gastroenterology, another screening expedition was conducted

in Cairu (BA). These expeditions involved volunteer doctors, nurses, and medical students performing tracking tests on the population. Furthermore, other actions with the same objective have been identified.

Program held by Barretos Cancer Hospital

A pilot screening program for colorectal cancer (CCR) was initiated in July 2015 at the Barretos Cancer Hospital (HCB) in São Paulo. The program was designed to address the predominantly advanced-stage disease observed in their patients. Patients between the ages of 50–65 who visited the HCB Prevention Clinic were selected for the program through direct invitations and based on interview responses. Patients who had undergone colonoscopy or flexible sigmoidoscopy in the past 5 years, had a family history of CCR or adenoma, or had documented inflammatory bowel disease (IBD) were excluded, while symptomatic patients were referred to a general practitioner. As a primary test, the qualitative FIT method Hemosure was used, with a cutoff point of 50 µg Hb/g of feces, followed by a diagnostic colonoscopy for patients with positive results. Patients with negative results were asked to repeat the tracking test after one year. In cases of cancer diagnosis, patients were referred for treatment at HCB, and for those diagnosed with adenoma, surveillance colonoscopy was scheduled based on the recommendations of the US Multi-Society Task Force on CCR.

During the process, polyps were removed, and biopsies were performed whenever possible. Advanced adenomas were defined as those with a diameter of at least 10 mm, 25% villous architecture, high-grade dysplasia, or early invasive cancer. Over a period of 2 years, the program enrolled 6,737 eligible participants, the majority of whom were women (73.6%) and from São Paulo (65.5%), followed by Minas Gerais (13.4%) and Goiás (11.7%). Among them, 92.8% returned the stool sample, and the highest FIT test return rate was observed among participants aged 50–54. Among the 6,157 patients with adequate test results, 12.7% tested positive.

Subsequently, the majority (84.6%) of the 779 participants with a positive FIT test underwent colonoscopy, with an average interval of 50.3–77.8 days between the results of both exams. In participants who underwent colonoscopy, the following findings were

observed: 176 (22.2%) normal mucosa, 231 (36.1%) hyperplastic polyps, 29 (4%) sessile serrated lesions, 391 (59.3%) early adenomas, 118 (17%) advanced adenomas, and 37 (5%) cases of cancer. Therefore, the rate of clinically significant lesion detection was equivalent to 7% (early adenoma, advanced adenoma, or cancer) (FIGURE 1).

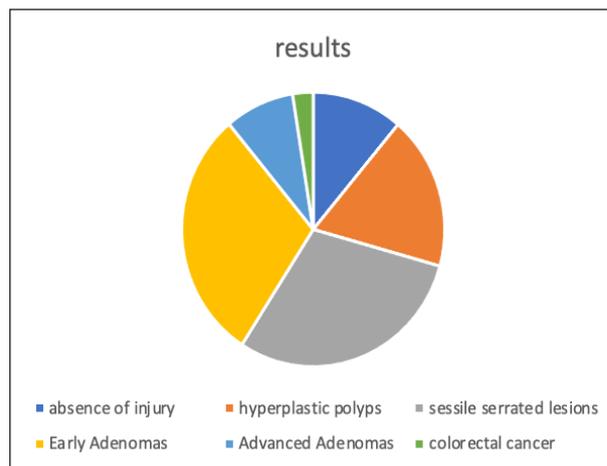


FIGURE 1. Results obtained in the colonoscopy exams in Barretos.

Unlike European countries, where the highest participation occurs in older individuals, the program had a higher adherence among individuals under 55 years old. Thus, although younger patients showed a more significant positivity rate in the tracking test, in colonoscopy, those between 60–65 years old had more cases of advanced adenoma and cancer.

The respective study had some limitations, such as a high incidence of symptomatic individuals in the program population, suggesting that comparing rates and results in the untracked population would be more appropriate. Despite this, the obtained results indicate the importance of the program in the early stages of colorectal cancer (CCR), as it showed an increase in the detection rate of stage 0–1 CCR from 10.2% to 38.7%, and a reduction in stage IV cases from 28.8% in the Brazilian National Cancer Registry (BNCR) to 6.5% in the HCB screening program, meaning a higher detection rate in earlier stages compared to the national cancer records in Brazil's HCB.

Multicenter program conducted by the University Hospital of USP

In 2013, a colorectal cancer prevention program was conducted at the University Hospital (HU) of the

University of São Paulo (USP). The target population consisted of USP employees and faculty members aged 50 to 75, with an estimated number of 7,500 individuals. Additionally, the population of the Butantã district aged 50 to 75 was also included. The multicenter project involved conducting screenings in 2013 at Fugast (Rio Grande do Sul) and A.C. Camargo Hospital (SP), and in 2015 at Santa Fé Medical Center (Arapiraca, AL) and Hospital das Clínicas (SP).

Regarding program adherence, an open approach was taken at the HU outpatient clinic to reach the Butantã population, without conducting a specific campaign. On the other hand, USP faculty members and employees were invited through a campaign organized by the university's endoscopy and health service to undergo the FIT (Fecal Immunochemical Test) examination. The qualitative cutoff point for the EikenFOBT Kit® was set at 50 ng/mL of feces, while the quantitative cutoff was set at 50–200 ng/mL of feces. The chosen method was based on its high specificity and low cost, as it does not require dietary restrictions and allows colonoscopy to be performed only in cases with a positive FIT result.

At the University Hospital of USP, from December 2013 to June 2017, a total of 5,732 FIT examinations were performed, out of which 289 (5.04%) tested positive based on the cutoff value of 50 ng/mL. Of these, 192 (66.4%) participants underwent colonoscopy, 47 (16.2%) were scheduled for future colonoscopy, and 50 (17.6%) participants either refused or had comorbidities.

Among the results of the colonoscopies, 72 out of 192 participants (37.5%) had normal results, 105 (54.68%) had adenomas (low-grade dysplasia/serrated), and 15 (7.81%) were diagnosed with cancer. Among the cancer cases, 8 (4.16%) had high-grade dysplasia, indicating the need for endoscopic treatment, and 7 (3.64%) had advanced cancer, requiring surgical treatment. (FIGURE 2)

In summary, the tracking was considered effective, with the FIT method yielding a positivity rate of 5.04% using a cutoff value of >50 ng/mL Hb. Therefore, its use is recommended for future programs. Additionally, the use of the FIT method has become routine in the medical practice of the University Hospital for asymptomatic individuals. Furthermore, the project highlighted the need for continuous efforts,

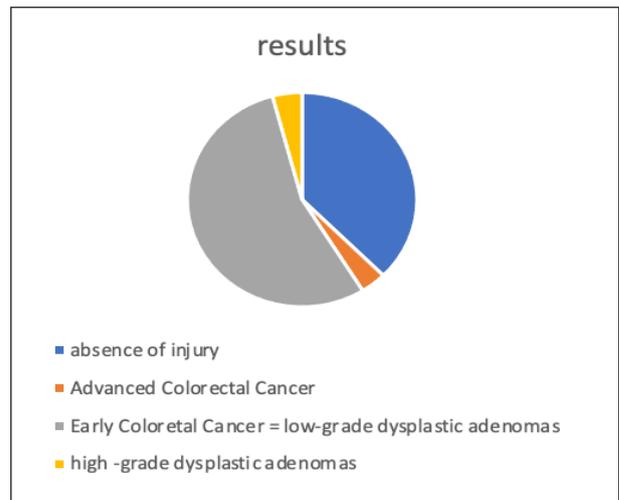


FIGURE 2. Results obtained through the colonoscopy exams by the University Hospital of USP.

particularly in raising awareness and developing a better CRC prevention program to ensure participant adherence and avoid rejection of colonoscopy following a positive FIT result.

At Santa Fé Medical Center in Arapiraca, 900 FIT tests were performed, with a positivity rate of 27 (3%) using a cutoff value higher than 100 ng/ml Hb, leading to 27 colonoscopies. Regarding the results of these colonoscopies, 16 (61.5%) were normal, 4 (14.8%) showed adenomas with low-grade dysplasia, 4 (14.8%) showed adenomas with high-grade dysplasia, and 3 (11.1%) were hyperplastic polyps (FIGURE 3).

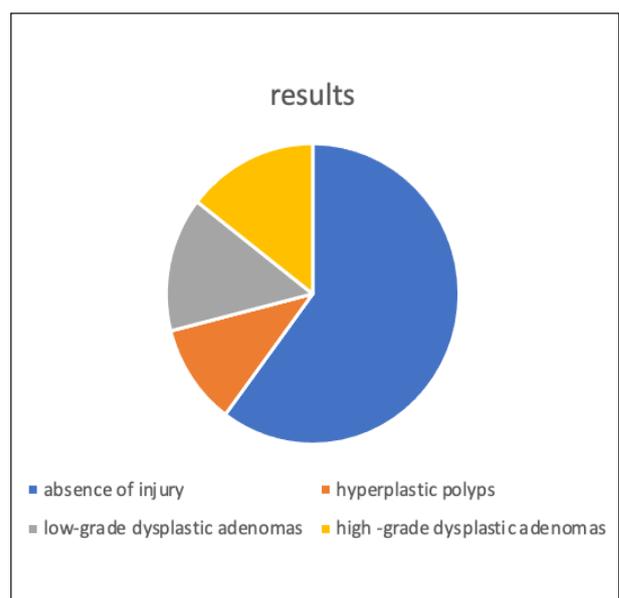


FIGURE 3. Results obtained from colonoscopy at Santa Fé Medical Center.

Program held in Santa Cruz das Palmeiras

A study was conducted in the municipality of Santa Cruz das Palmeiras, SP. This municipality has a population of 28,318, of which 8,337 are over 40 years old.

The study aimed to perform tracking using the FIT Hemosure® method on all asymptomatic individuals over 40 years old who had never been screened for CRC. Those with negative results were recommended to repeat the test annually, while those with positive results were referred for colonoscopy and subsequent treatment if necessary. However, all patients were to be followed for a minimum of 10 years.

From August 2006 to March 2007, a total of 4,567 Hemosure® kits were distributed to individuals who met the inclusion criteria. This number represented 54.8% of the population over 40 years old. Out of these, 905 (19.8%) kits were not returned, and 22 (0.5%) could not be analyzed due to improper collection of the samples. Therefore, 3,640 tests were analyzed, representing 43.7% of the target population and 79.7% of the distributed tests. A total of 390 tests were positive (10.7%).

Out of the 245 positive patients who were called for colonoscopy, 33 (13.5%) refused. Among the 212 colonoscopies performed, the following diagnoses were made: 59 with one or more polyps (76 low-grade adenomas, 4 high-grade adenomas, and 21 hyperplastic), 9 with adenocarcinomas, and 91 with normal colonoscopy results. Fourteen biopsies were negative, indicating inflammatory infiltrate or only mucosa with edema.

Among the patients with adenocarcinoma, three were treated endoscopically due to small and early lesions (one polypectomy and two mucosectomies), while the other six patients were referred for surgical and chemotherapy treatment.

Study held in em Porto Alegre (Teixeira; et al, 2017)⁽¹³⁾

A prospective observational study was conducted from April 2015 to January 2016 at gastroenterology referral centers. The study included 1,039 volunteers between 50 and 75 years old with an average risk of developing CRC but without symptoms of intestinal disease. All participants underwent fecal occult blood

testing using the FIT (I-FOBT) method, followed by colonoscopy, regardless of the tracking test results.

Out of the total, 948 (91.2%) participants completed both phases of the tracking, colonoscopy, and testing of occult blood in feces. Among the 73 participants who underwent colonoscopy and had a positive tracking test, advanced CRC was detected in 9 (12.3%) cases, early-stage CRC in 2 (2.7%) cases, high-grade dysplastic adenomas in 7 (9.5%) patients, and low-grade dysplastic adenomas in 25 (34.5%) patients (FIGURE 4).

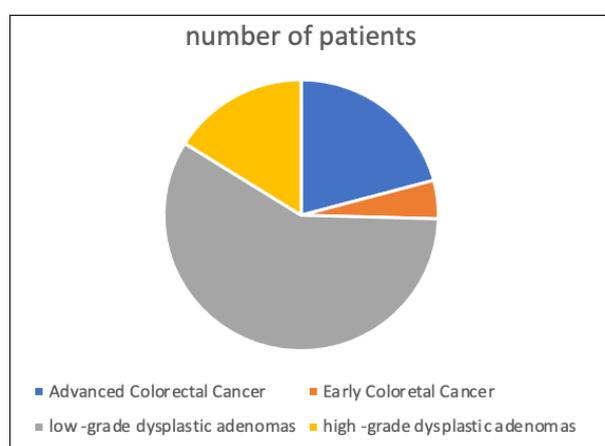


FIGURE 4. Results of participants who completed both phases of the tracking.

The remaining participants, corresponding to 243 negative results in occult blood in feces test, when undergoing colonoscopy, resulted in 1 case of advanced CRC (0.4%) and 91 low-grade dysplastic adenomas (37.6%). Thus, the overall identification rate of CRC in the entire screened population was 1.05%, which means 11 patients with the disease out of every 1,039 volunteers (FIGURE 5).

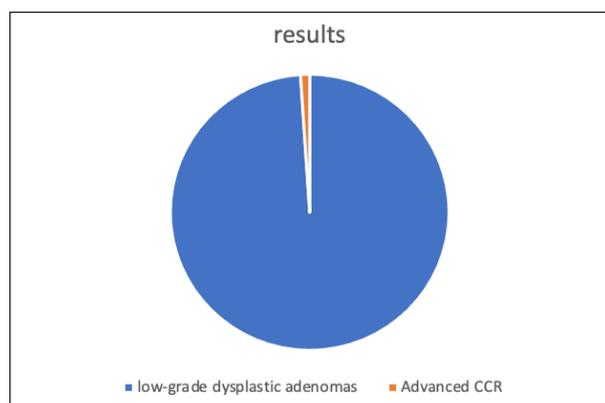


FIGURE 5. Results of negative results in occult blood in feces cases.

The conclusion of the present study was that fecal occult blood testing, when performed in colorectal cancer screening programs in Brazil, showed highly positive outcomes for the detection of high-risk cancers and adenomas. Thus, the i-FOBT is feasible for screening the population at moderate risk of developing the disease.

SOBED Joint Efforts

Between 2015 and 2019, as part of an initiative by SOBED, 14 joint efforts were conducted to perform the tracking of the population. The first tracking took place at PUC Campinas (PUCCAMP) and targeted a population with an average age of 65 years. Individuals were tracked using the FIT (FOBT) test, and those with positive results were referred for colonoscopy. Out of the 100 colonoscopies performed, 6% revealed the presence of CRC (colorectal cancer), while 62% showed the presence of adenomas.

Other cities in the country were included in the project, and screenings were conducted in Campinas, Maceió, Rio de Janeiro, Goiânia, and Curitiba, totaling 449 patients, as described in TABLE 1. Among them, 46.1% had positive results for adenomas, 1.55% had early-stage CRC, 2.44% had advanced-stage CRC, and 49.91% showed no lesion. FIGURE 6.

Belterra (Averbach et al, 2021)⁽¹⁴⁾

The provision of healthcare services in remote areas has always been a challenge. Thus, the Belterra project was a study conducted in the Amazon region, specifically in the community of Belterra. Its objective was to perform colorectal cancer screening in the population of the area and present the results.

To achieve this, data collection was carried out through forms filled out by physicians and medical students enrolled in the program from October 2014 to December 2017 in Belterra and Pará, with the support of public-private partnerships for finan-

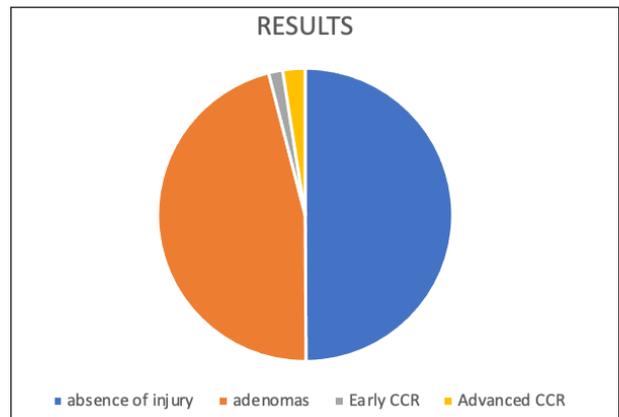


FIGURE 6. Results obtained in the regions where SOBED trackings were conducted.

cing. In this project, 19 expeditions were conducted, where 2,022 inhabitants, aged between 50 and 70 years, were screened for their medical history and underwent physical examinations, fecal tests, and endoscopic procedures.

Fecal occult blood testing (FOBT) was performed on some patients, and out of these, 64 patients (3.4%) had positive results. Among the 64 positive cases, one patient was diagnosed with colorectal adenocarcinoma (1.6%) and 13 patients had at least one diagnosed and removed polyp. Low-grade dysplasia was diagnosed in nine patients, two patients had adenomas with high-grade dysplasia, and two patients had synchronous polyps with both low and high-grade dysplasia (FIGURE 7).

A total of five colorectal adenocarcinomas were diagnosed, along with several lower-stage lesions. Therefore, among the participants who underwent colonoscopy, 26% presented some form of colonic lesion.

Of the remaining 459 patients with negative FOBT, 41 had high-risk adenomas, and four were diagnosed with adenocarcinoma. Other abnormal findings included diverticulum (50.4%), flat lesion (3.8%), colitis (3.3%), and arteriovenous malformation (1.6%) FIGURE 8.

TABLE 1. Results obtained in the regions where SOBED screenings were conducted.

Locality	Patients	Adenomas	Early crc	Advanced crc	Absence of injury
Campinas	99	63	3	5	28
Maceió	142	46	2	3	91
Rio de janeiro	66	28	1	1	36
Goiânia	77	35	0	0	42
Curitiba	65	36	0	0	29
Total	449	46.10%	1.55%	2.44%	49.91%

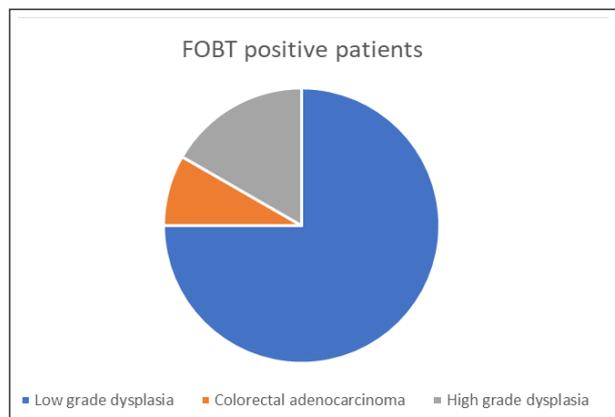


FIGURE 7. Result of the findings in patients with positive FOBT.

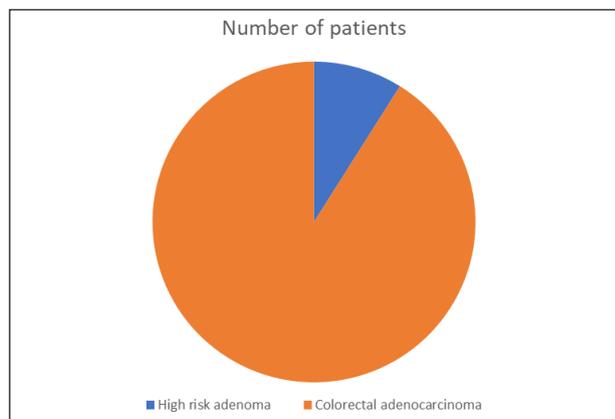


FIGURE 8. Result of findings in patients with negative FOBT.

Despite the geographic, cultural, and financial barriers, this study suggests that the implementation of a gastrointestinal cancer tracking program for remote Brazilian populations is feasible, achieving high adherence. Although the logistics are demanding, these campaigns can be a good strategy to provide mass CRC screening for underserved populations.

Tracking project held in Piranhas – AL

This is a descriptive, analytical, and interventional study submitted on November 26, 2018. The project was carried out in the Municipality of Piranhas, Alagoas, at the Josiclei Dias Nobre Basic Health Unit (UBS), located in the Piau village.

Individuals between the ages of 50 and 70 were included in the sample, registered by their respective community health agents (ACS), and signed the informed consent form for the fecal occult blood test (FOBT) using the FIT method and subsequent colonoscopy for patients with a positive test result.

Medical students, ACS workers, and physicians completed standard data collection forms for the program. The forms contained general patient information, personal history, FOBT, and colonoscopy results.

The UBS received a total of 2,500 FIT kits, of which 2,152 were performed, representing an 86% adherence rate among the target population. For the sample, 141 (6.5%) patients were selected, of whom 115 (81.5%) had a positive FOBT and 26 (18.5%) had a negative result. Out of these, 130 patients underwent colonoscopy, while 11 did not undergo the exam due to non-attendance on the scheduled day, failure to properly prepare the bowel, or health issues.

The study observed that among the 130 participants, 36% (n=47) were male and 64% (n=83) were female. In terms of age, 46 (35.3%) patients were between 50 and 55 years old, 37 (28.4%) were between 56 and 60 years old, 25 (19.2%) were between 61 and 65 years old, and 22 (16.9%) were between 66 and 70 years old.

A total of 101 polyps were detected, ranging from 1 to 5 polyps per patient. Of these, 76 (75.2%) were adenomatous polyps found in 44 patients (33.8%). The adenoma detection rate (ADR) was 33.85%. Among these findings, the most frequent histological types were tubular adenoma with low-grade dysplasia, accounting for 51.5% (n=51) of the total, and high-grade dysplasia, accounting for 14.1% (n=14) (FIGURE 9).

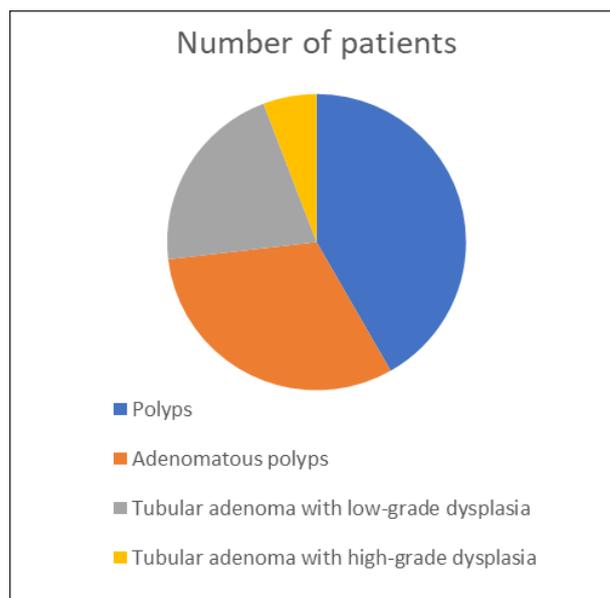


FIGURE 9. Results of findings in colonoscopy

Tracking project held in Cairu⁽¹⁵⁾

This colorectal cancer screening program was conducted in late March 2023 with the aim of providing greater access to colonoscopy and upper gastrointestinal endoscopy for the population, thereby improving the prognosis for those with positive outcomes.

In this study, a total of 169 colonoscopies and 13 upper gastrointestinal endoscopies were performed, with 11 patients undergoing both procedures. Among the patients who underwent colonoscopy, only five needed to repeat the examination due to inconclusive results. Out of the total number of procedures performed, 76 patients required histopathological examination of the collected samples.

Although this initiative is still ongoing and the data is still being collected, it was mentioned in this study to demonstrate the importance of such actions in the development of colorectal cancer tracking policies.

Colorectal cancer tracking by the modified Guaiac test: a multicentric study in Brazil⁽¹⁶⁾

Conducted in 1983 in different states of Brazil, this research aimed to analyze the effectiveness of early detection of colorectal cancer through the fecal occult blood test using the modified guaiac method. The project involved a population of 3,000 individuals over 40 years of age, divided into two groups: completely asymptomatic patients and patients who reported complaints that did not include intestinal bleeding.

Participants were provided with an envelope containing three cards impregnated with guaiac resin to collect two stool samples. In total, six stool samples were collected from each individual. The tests were considered positive when there was a blue color appearance on one or more strips with the resin. Patients with positive results were informed about the importance of follow-up with further examinations. All patients identified with colorectal neoplasms underwent surgery.

It is worth noting that the overall acceptance of the population evaluated in the study was 73.1% (2,193 participants). In the first group, 988 (98.8%) negative results and 12 (1.2%) positive results were observed. Of these, 10 individuals with positive tests

underwent additional examinations for diagnosis elucidation, while the other two individuals did not return for further tests. In the second group, 1,905 (95.2%) negative results and 95 (4.8%) positive results were observed. Of these, 78 patients completed the investigation.

In the entire studied population, 10 (0.33%) cases of malignant neoplasms and 13 (0.43%) cases of adenocarcinoma were found. Thus, the study concluded that the fecal occult blood test using the modified Guaiac method (Haemocult test) is an effective and easily accepted method for colorectal cancer screening (FIGURE 10).

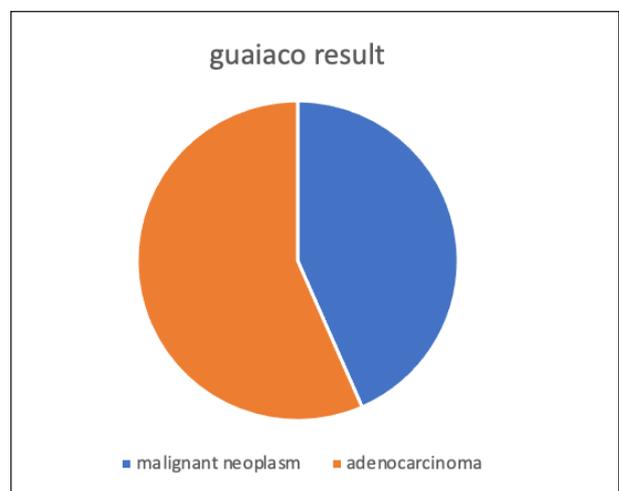


FIGURE 10. Results of findings in patients

DISCUSSION

The ideal method for screening should be low-cost, safe, easily performed, highly sensitive and specific, and acceptable to both physicians and patients. The American Cancer Society (ACS)⁽⁷⁾ categorizes secondary screening methods into stool-based tests, which are less invasive, but require more frequent testing, and visual examinations of the colon and rectum. It is recommended to perform annual fecal immunochemical testing (FIT) and high-sensitivity guaiac-based fecal occult blood testing (gFOBT), or every 3 years, the multi-target stool DNA test (mt-sDNA) (Coy et al., 2014)⁽¹⁷⁾.

The gFOBT method involves using a chemical product to detect the heme group in a stool sample⁽¹⁸⁾. (Fante R et al., 1997). However, it has the disadvantage of requiring the collection of three stool samples

on different days and not being able to distinguish the origin of the bleeding, which necessitates dietary restrictions prior to the test. On the other hand, the FIT method analyzes the qualitative and quantitative presence of human hemoglobin in a stool sample through antibody analysis, considering values above 20 µg of hemoglobin per gram of stool, with higher sensitivity and specificity. As for mt-sDNA, it performs a qualitative detection of DNA markers associated with CRC, assessing genetic alterations, making it more sensitive than FIT but with lower specificity⁽¹⁹⁾. (Carethers, 2023)⁽²⁰⁾ (Pires et al., 2021).

Regarding structural examinations, colonoscopy is recommended every 10 years, computed tomography colonography (CTC) or flexible sigmoidoscopy (FSIG) every 5 years⁽⁷⁾. (ACS, 2023). Furthermore, it is worth noting that in special cases and individual circumstances, such as patients with a family history of colon polyps or early-onset CRC, genetic tests are recommended to identify the risk of hereditary cancer⁽⁵⁾. (Santos Junior, 2007).

Based on the initiatives mentioned, the use of FIT and high-sensitivity guaiac testing was observed, with the former being used in the majority of programs, which aligns with the findings in the literature, in order to associate the best sensitivity, specificity and cost benefit.

An example of this was carried out in the Porto Alegre study, which proved that the fecal occult blood test, when performed in colorectal cancer screening programs in Brazil, showed highly positive results for the detection of high-risk cancers and adenomas.

Despite the high incidence of CRC, mortality rates have decreased in the past two decades in more developed countries, while the opposite has occurred in underdeveloped countries. (Davidson KW et al., 2021)⁽²¹⁾. This can be attributed to the implementation of CRC screening programs in these countries, allowing for early diagnosis, treatment of precancerous lesions, and CRC management⁽²²⁾. (Stigliano, 2014). An example of this is seen in Asia and Europe, where screening is recommended between 50–75 years of age using quantitative FIT methods, with annual or biennial exams, followed by continued monitoring in positive patients⁽²³⁾. (Onyoh et al., 2019)⁽²⁴⁾ (Navarro et al., 2017).

Based on the ACS guidelines⁽⁷⁾, CRC is more common after the fifth decade of life, and its symptoms appear late, when the disease is in advanced stages, hindering treatment and generating high costs for society. Therefore, the European Code Against Cancer and the⁽²⁵⁾ American College of Gastroenterology recommend participation in CRC screening programs for individuals at average risk of CRC starting at 50 and 45 years of age, respectively. The ACS also determines regular screening with a high-sensitivity fecal-based test or a structural examination, with positive results followed by timely colonoscopy, and continuous screening in healthy individuals until the age of 75. After this phase, screening should be individualized⁽²⁶⁾. (Wolf et al., 2018) Therefore, the presented programs aligned with these recommendations in the development of their strategies, both in relation to the age started and the methods used.

The benefits of CRC screening have been recognized for four decades since the American Cancer Society started recommending it⁽²⁷⁾. (Karsenti et al., 2019) Screening has been responsible for the decline in CRC incidence since the 1980s. Randomized studies have demonstrated that screening individuals at average risk, i.e., those without a family history of CRC, reduces the incidence and mortality associated with this neoplasia⁽²⁸⁾. (Lieberman et al., 2016)⁽²⁴⁾ (Navarro et al., 2017).

The importance of CRC screening is based not only on the possibility of early diagnosis but, above all, on the impact of endoscopic polypectomy, which reduces CRC-related mortality by 50% to 80%⁽²⁴⁾ (Navarro et al., 2017). What is seen in most of the reported studies⁽²⁹⁾ (Mello MRSP et al., 2020). Furthermore, its outcome depends on how it is conducted. Thus, programs that begin with fecal occult blood testing (FOBT) in patients aged 50 to 75 years have reduced the incidence of CRC by 47% to 72%⁽²⁸⁾ (Lieberman et al., 2016)⁽²⁴⁾ (Navarro et al., 2017)⁽³⁰⁾. (Knudsen et al., 2016).

The effectiveness of screening using tests with FOBT detection has been proven, with a higher trend for annual exams (RR: 0.68; 95%CI, 0.56–0.82) compared to biennial collections (RR: 0.78; 95%CI, 0.65–0.93), in follow-ups ranging from 11 to 30 years, resulting in reduced CRC mortality⁽³¹⁾ (Shaukat et al., 2013)⁽³²⁾ (Hardcastle et al., 1996). On the other hand,

a program that suggested colonoscopies every 10 years reduced the incidence of CRC by 62% to 88%⁽³⁰⁾ (Knudsen et al., 2016).

The programs implemented in this work showed a benefit from the execution of screening using both screening methods, as seen in the study conducted at the Barretos Hospital, which exceeded the desirable level of the European Union guidelines for the required FIT return rate to ensure quality in CRC screening (>65%) within the first 2 years. Furthermore, contributing to the quality standard of screening, colonoscopy completion rates were also highlighted compared to those reported in FIT-based programs in the UE and exceeded the recommended levels (>95%).

In addition, the multicenter program carried out in Brazil in 1983 also proved the effectiveness of the modified guaiac method for colorectal cancer screening.

Two studies were conducted for colorectal cancer screening with some similar points. The Belterra project focused on a remote community in the Amazon, involving 2,022 participants with 3.4% positive results in fecal occult blood tests (FOBT). There was a 1.6% diagnosis of colorectal adenocarcinoma, and 26% showed colonic lesions. The Piranhas-AL project achieved 86% adherence, performed 130 colonoscopies, identified a 33.85% adenoma detection rate, and found adenomas with low (51.5%) and high (14.1%) dysplasia. Both studies demonstrated the feasibility of screening in remote areas and provided insights into colonic lesions and adenomas, emphasizing the importance of effective health interventions.

In Brazil, the national cancer care policy focuses on cancer incidence and mortality, both nationally and universally. However, it is necessary to evaluate regional characteristics in order to define health policies due to socioeconomic inequalities that reflect on access to healthcare⁽²⁾ (Dutra et al., 2018)⁽³⁾ (Liang et al., 2016)⁽³³⁾, (Dominguez RGS et al., 2020) This can be observed in the multicenter project carried out by USP as well as in the SOBED outreach campaigns, which were conducted in various regions of Brazil and therefore needed to be adapted to local realities. For this purpose, easy-to-perform methods were chosen, at an affordable cost and better accepted by patients, in order to allow following the recommendations and completing the screening program.

Two distinct studies conducted in Brazil, one in 2023 and the other in 1983, offer valuable insights into enhancing colorectal cancer detection and tracking. The 2023 initiative focused on expanding access to endoscopic procedures, performing 169 colonoscopies and 13 upper gastrointestinal endoscopies. The study highlighted the importance of histopathological examination, with 76 patients requiring this assessment. In contrast, the 1983 study utilized a modified Guaiac test, involving 3,000 participants divided into symptomatic and asymptomatic groups. The method identified 10 cases of malignant neoplasms and 13 cases of adenocarcinoma. While the 2023 project emphasized accurate endoscopic examinations, the 1983 study pioneered effective non-invasive screening through fecal occult blood tests. Both studies contribute to Brazil's commitment to combating colorectal cancer and shaping improved tracking and screening policies.

The absence of tracking programs affects not only the urban population but especially remote communities, where access to healthcare is precarious, making them more vulnerable to this situation. An example of this was the Belterra project in Pará, which aimed to promote CRC tracking among the population of a village in the Amazon region, as well as raise awareness about its importance. The screening project had a 95% participation rate, with 5 (0.26%) patients being diagnosed with adenocarcinoma, demonstrating that with the support of public and private partnerships, it is possible to implement a colorectal cancer tracking program in remote populations. Approximately 26% of Belterra residents who underwent colonoscopy presented some colonic lesions, confirming the need for an effective screening program for early detection and treatment and is in line with the data found in the literature⁽¹⁰⁾. (Assis, 2011)⁽¹¹⁾; (Averbach, 2020).

The National Policy for Oncological Care (PNAO) in Brazil, established in 2005, institutes the promotion, prevention, diagnosis, treatment, rehabilitation, and palliative care for the population. Several epidemiological studies, including those discussed in this paper, demonstrate the effectiveness of prevention programs in reducing CRC morbidity and mortality⁽²⁾ (Dutra et al., 2018). However, the Ministry of Health has not yet implemented population tracking progra-

ms for CRC and continues to recommend the dissemination of warning signs and, in these cases, immediate access to examinations and timely treatment. (Carvalho et al., 2021)⁽³⁴⁾.

Therefore, CRC is a preventable and, above all, curable neoplasm. Its early diagnosis, along with treatment initiation within approximately 60 days after diagnosis, allows for greater patient survival⁽³⁵⁾ (Aguilar Júnior et al., 2020)⁽³⁶⁾, (Lima et al., 2021). Thus, studies demonstrate that cases with early diagnosis have a 5-year survival rate of 90% for diseases confined to the intestinal wall, 68% for lymph node disease, and 10% for metastatic diseases⁽³⁷⁾ (RIES; et al., 2007). This can also be seen through the decreasing trend in deaths in some countries of the European Union, where there is greater availability for early diagnosis, as well as endoscopic resection of adenomatous polyps and advancements in cancer treatment techniques⁽⁴⁾ (Oliveira et al., 2018).

These studies collectively highlight the effectiveness and feasibility of various colorectal cancer tracking methods, with a focus on early detection, diagnosis, and subsequent treatment. Different screening methods, adherence rates, and geographic contexts contribute to a comprehensive understanding of colorectal cancer tracking efforts in Brazil. (Azevedo G et al., 2020)⁽³⁸⁾.

The effectiveness of screening depends on how it is conducted. So, seeking to make the program viable and effective, it is recommended to initially perform the screening using the FIT method, preferably followed by colonoscopy in positive cases from the age 45. (Sarraf JS et al 2020)⁽³⁹⁾.

CONCLUSION

This study showed that despite isolated efforts in our country, there is no defined cancer screening policy, and most CRC cases in Brazil are still identified at an advanced stage. So, if implemented, it would probably reduce mortality from this disease.

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Authors' contribution

Toledo CM: conceptualization, data curation, formal analysis, investigation, methodology, project administration, writing (original draft), writing (review and editing), visualization and validation. Almeida LMPR: conceptualization, formal analysis, investigation, writing (original draft) and writing (review and editing). Averbach M: conceptualization, supervision, writing (review and editing) and validation. Barbosa JLS: supervision and writing (review and editing).

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Toledo CM, Almeida LMPR, Averbach M, Barbosa JLS. Análise das iniciativas de rastreamento do câncer colorretal no Brasil. *Arq gastroenterol.* 2023;60(4):450-62.

RESUMO – Contexto – O câncer colorretal (CCR) é um importante problema de saúde pública, uma vez que representa a terceira neoplasia mais diagnosticada no mundo e a quarta causa de mortalidade. Sua prevenção pode ser dividida em primária, secundária, demonstrada pelas técnicas de rastreamento e terciária, que consiste no diagnóstico de câncer em pacientes sintomáticos. Apesar de apresentar uma alta incidência, as taxas de mortalidade diminuíram nas últimas duas décadas nos países desenvolvidos, enquanto o contrário ocorreu em países subdesenvolvidos, o que atribui-se a elevação dos programas de rastreamento colorretal nesses países, de modo que permite o diagnóstico precoce e o tratamento de lesões pré-cancerosas e do CCR. Desse modo, a *American Cancer Society* divide os métodos de rastreio secundário em testes baseados em amostras de fezes e exames visuais do cólon e reto, indicando-se seu início a partir dos 45 anos de idade, em pacientes de baixo risco. **Objetivo** – Verificar de forma analítica as ações de rastreamento do câncer colorretal realizadas no Brasil, de modo a avaliar a necessidade da implementação de um programa nacional de rastreamento do CCR. **Métodos** – A metodologia baseou-se em um estudo secundário quantitativo descritivo que correlacionou a incidência do CCR e sua morbimortalidade e o impacto dos programas de rastreamento precoce. Foram incluídas atividades não relatadas na literatura médica através de contatos pessoais com coordenadores de programas regionais, de modo a comparar com os dados existentes na literatura. Utilizou-se como variáveis as estratégias de triagem, os exames realizados e seus respectivos resultados. **Resultados** – Foram descritos nove programas realizados em diversas regiões do Brasil utilizando dois métodos de rastreio para o CCR, um não invasivo que consiste na pesquisa de sangue oculto nas fezes, sendo a maioria pelo método FIT; e outro invasivo, tendo a colonoscopia como representante. Essas iniciativas foram efetivas na detecção de formas precoces desta doença. **Conclusão** – Apesar da existência de diversos programas de rastreamento de início privativo e a ampla divulgação da importância do rastreamento e diagnóstico precoce do CCR, foi demonstrado que o Brasil carece de um programa nacional que padronize as formas de rastreio, o que reflete na maior prevalência de diagnósticos tardios na população.

Palavras-chave – Câncer colorretal; Brasil; prevenção; triagem.

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