

ORIGINAL ARTICLE

IMPACT OF COLONOSCOPY AND MORTALITY RATE OF COLORECTAL CANCER PATIENTS DURING 2008–2020 IN PAKISTAN

Ammara Waqar, Amjad Khan*, Hamid Mahmood**, Sidra Khan***, Abdul Majeed Akhtar[†], Syed Bilal[†]Department of Public Health, Gulab Devi Teaching Hospital, Lahore, *Oxford University, UK, **Department of Biochemistry, Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad, ***University South Wales, UK, [†]The University of Lahore, Lahore, Pakistan

Background: Colorectal cancer (CRC) is the second neoplasm more frequent in women and the third largest in men. Its silent evolution makes early diagnosis difficult. Objective of this work was to identify data the impact of introduction of prognosis colonoscopy of patient with colorectal neoplasms in Pakistan. **Method:** This was an observational, quantitative, analytical, retrospective and transversal study. Patients aged >40 years with colorectal neoplasms entered into the hospital admission system and listed in the ICD chapter as neoplasms were included. Patients with morbidities outside the predetermined period, having Neoplasms that are not of colorectal origin, or aged under 40 years of age were excluded. The analysis of the incidence and number of related deaths due to the CRC before and after the endoscopic procedure was made. **Results:** It was possible to determine the pattern of evolution of the number of hospitalizations for CRC between 2008 and 2020, considering 2013 as a milestone due to the introduction of colonoscopy. **Conclusion:** This study may benefit with information more consistent with leave from the reduction of the prerequisites the realization of colonoscopy. Expanding access to endoscopic examinations appears capable of promoting an even greater reduction in morbidity and mortality related to coloproctological neoplasms.

KEYWORDS: Colonoscopy, Colorectal neoplasms, Diagnosis, Mortality

Pak J Physiol 2025;21(1):34–40, DOI: <https://doi.org/10.69656/pjp.v21i1.1838>

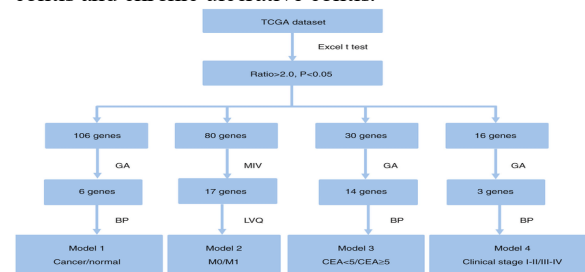
INTRODUCTION

Colorectal cancer (CRC) is a major public health problem, in Pakistan and worldwide. According to the World Health Organization (WHO), it is of the second neoplasm more frequent in women and the third largest in men.¹ Its silent evolution makes early diagnosis difficult, giving it a worse prognosis when detected in more advanced stages.²

Statistically, the CRC does not present a homogeneous incidence throughout the country, presenting cases with bigger prevalence in Baluchistan and KPK Provinces. In addition, Regarding age, the majority of population affected by colorectal neoplasia is in 60-year age range (average 67 years).³ Therefore, the older the age range, the greater the possibility of risks of complications in relation to this neoplasia.⁴

Clinically the CRC manifests itself according to form of location of tumour: i) The cancer of colon introduces as lower bleeding, predominating occluded blood hidden in the faeces. In the advanced phases of the neoplasia in masses, they can be identified in the right hemi abdomen. There is involvement of the colonic wall vessels or tumour ulceration with haematochezia; ii) The obstructive or semi-obstructive condition is more frequent in the left colon, evolving with changes in the evacuation habit, such as tenesmus and sensation of incomplete evacuation, with tumour progression to the rectum or in primary lesions of the rectum. These symptoms may be accompanied by weight loss, abdominal and/or pelvic pain, and anaemia² which if

worsens, with the volume of spontaneous bleeding or bowel movements. With a higher incidence between 50 and 75 years of age, the development of this pathology is associated with certain risk factors: diet rich in animal protein and/or processed foods and low in fibre, positive family history of CRC and/or adenomatous polyps, history of inflammatory bowel disease such as Crohn's colitis and chronic ulcerative colitis.³



Flow-chart for diagnosis of colorectal cancer

The search for blood hidden in the faeces is one of the most traditional and easy to perform among those used for the diagnosis of CRC, being used worldwide as first line of tracking of colorectal neoplasms. The technique consists of the fact that adenomatous polyps and carcinomas bleed. If bleeding is not clinically detectable, investigation of small haemorrhages can help in early diagnosis and screening of population groups at risk. However, the method has low sensitivity and low specificity, since several other intestinal alterations can cause haemorrhages, which results in a large number of false positives, making it essential to perform

radiological and/or endoscopic examinations to define the diagnosis.⁷

Discovered in the 1960s, the tumour marker CEA is one of the main markers used to forecasts of colorectal neoplasia in the clinical practice.^{8,9} This marker has low sensitivity for primary diagnostic detection. In postoperative screening of tumour resection, its sensitivity can exceed 90% in identifying loco regional recurrences or liver metastases.¹⁰

Due to the excellence of colonoscopy in investigating CRC, radiological examinations are currently relevant in the preoperative staging and postoperative monitoring of this neoplasm, investigating metastases in organs such as the liver and lung, infiltrations or extensions tumoural in the reviews postoperative.^{11,12} Among the methods more used are the computed tomography, the magnetic resonance and ultrasound.¹³ The colonoscopy consists exam of Population endoscopic study of intestine thick and of part of the small intestine by introducing a flexible fibre optic observation tube through the anus until the caecum, with Prohibited ileum terminal through the ileocecal valve.¹⁴

Despite the propaedeutic relevance of colonoscopy for diagnosis of CRC, factors influence the less frequent performance of this examination in clinical practice: i) Need of strict preparation; ii) Possibility of to feel pain during and after the exam; iii) High cost.¹⁵

The colonoscopy was introduced in the list of procedures. Indications for colonoscopy were: lower digestive haemorrhage (different from classic anal bleeding), inflammatory bowel diseases, chronic diarrhoea, malignant or benign colon tumour, diverticular disease of the colon, colon polyps, angiodysplasia.^{16,17} However, there are some prerequisites for release of this propaedeutic investigation: i) Detailed clinical history with personal and family history related to the pathology; ii) Propaedeutic investigation by ultrasound, recto-sigmoidoscopy or radiological examination prior to the endoscopic examination; iii) Request made by a general surgeon, gastroenterologist and proctologist. Patients with tumours and haematochezia have priority.

Despite the possible technical complications of colonoscopy and the limitations of its realization, this exam has revealed its fundamental importance to the detection of intestinal injuries in initial phase, especially thick intestine. It allows an early therapeutic approach with the removal of adenomatous polyps and the performance of tumour resection surgeries in the places where the lesions have become malignant.¹

The objective of this study was to identify the impact of introduction of prognosis colonoscopy of colorectal neoplasm cases in Pakistan, and to analyse related deaths due to CRC before and after introduction of endoscopic procedure.

METHODOLOGY

This work consists of an observational, quantitative, analytical, retrospective and transversal study. These data cover the period between January 2008 and December 2020, in order to promote an analysis of parameters relative to the CRC and implementation of colonoscopy.

Criteria of inclusion: they were: i) Sex (without distinction); ii) Individuals bigger of 40 years; iii) Patients present neoplasms colorectal (neoplasia maligna of colon, malignant neoplasm of the recto sigmoid junction, neoplasm of the rectum, anus and anal canal) entered into the hospital admission system and listed in the ICD chapter as neoplasms.

The following **exclusion criteria** were adopted: i) Morbidities outside the predetermined period; ii) Neoplasms that are not of colorectal origin; iii) Patients under 40 years of age. After selecting the database, the methodological analysis occurred as illustrated in Figure 1.

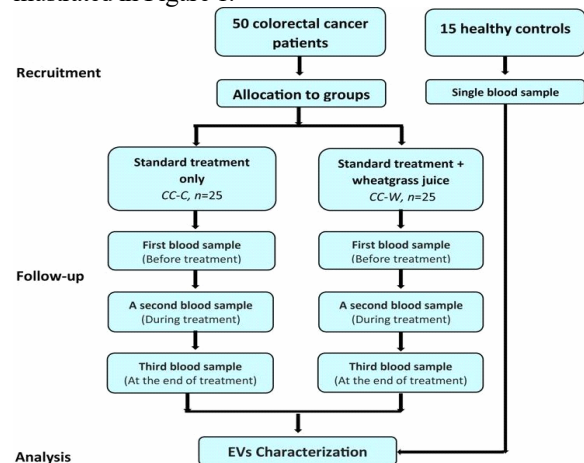


Figure-1: Method of study

In the first stage, a study was carried out on the pattern of evolution of the number of hospitalizations due to CRC in the stipulated period. It was followed by the division of the sample according to sex, considering: i) Variations in the mortality rate, using the t-Test to measure and validate the observed differences; and ii) Evolution of the total number of hospitalizations age of patient the leave of 40 years, establishing itself intervals of 10 years between groups age groups. THE significance statistic of this analysis was verified through the Kruskal-Wallis test.

In the second stage, sample from five Pakistan geographic regions was studied regarding:

- i) Variation in the mortality rate due to CRC during the period, using the ANOVA test in the Dunn method to validate the information for this analysis; and
- ii) Evaluation of evolution of number of hospitalizations due to colorectal neoplasia, using ANOVA in Tukey's method to verify and confirm the statistical significance of the results.

RESULTS

It was possible to determine the pattern of evolution of the number of hospitalizations for CRC between 2008 and 2020, considering 2013 as a milestone due to the introduction of colonoscopy. It is observed in all the analyzed period, with exception of year of 2020, the curve referent to number total of admissions of patients aged ≥ 40 years with diagnosis of colorectal neoplasia was ascending. Being in 2008 corresponding to 35,863 cases and in 2019 corresponding to 86,009 cases, which represents an increase of 139.8%. (Figure 2).

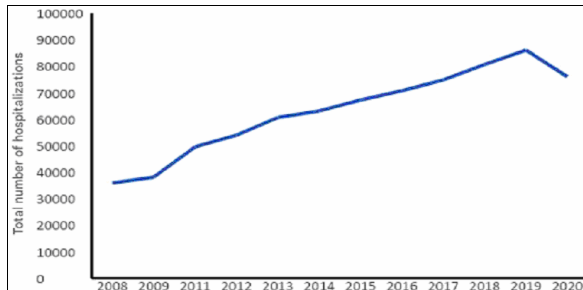


Figure-2: Number of hospitalizations with age of 40 years or more diagnosed with colorectal neoplasia between 2008 and 2020

The analysis of the data represented in Figure 2 aroused interest in the prognosis of these patients after the introduction of colonoscopy by the hospitals in Pakistan. For this purpose, the variation in the mortality rate due to CRC between the sexes was evaluated and the results can be seen in Figures-3 and 4.

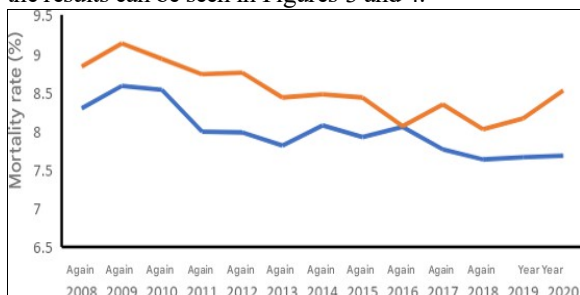


Figure-3: Mortality rate in admitted colorectal neoplasia cases aged >40 years according to sex from 2008 to 2020

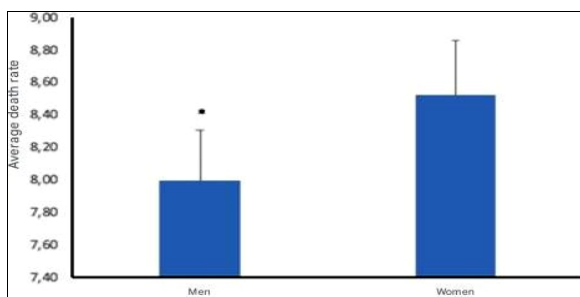


Figure-4: Average mortality rate in hospitalized cases of colorectal neoplasia aged >40 years, according to sex from 2008 to 2020. ($p < 0.001$)

Both sexes showed a decrease in the variation rate of mortality colorectal neoplasia in Jan 2008 (8.29% in males and 8.83% in females) to Dec 2020 (7.68% in males and 8.52% in females) However, the graphs reveal a different statistical behaviour between sexes. While there is a tendency towards balance in males, with small variations upwards or downwards since 2013, the predominance of mortality due to CRC remains in females, and, despite the decrease with equivalence to the values male in 2016 (8.06%), the number of deaths recovers its upward trend after 2018 (6%). (Figure-3).

In order to statistically confirm the differences observed in the result previous, evaluated to the averages of the rates of mortality second the sex, through *t*-test. A significant difference was confirmed between men and women regarding the average mortality rate due to colorectal neoplasms, in patients over 40 years of age, with the average mortality rate of the women ($8.52 \pm 0.34\%$) bigger of the average from the rate of mortality of men ($8.00 \pm 0.31\%$). (Figure-4).

After analyzing the variation in mortality rate in both sexes, considering the age range as important factor of risk to development of the CRC, the impact of age on hospitalization due to colorectal neoplasia was evaluated in both sexes. The results are shown in Figures-5 and 6.

Differences were significant ($p < 0.0001$) for the test of Kruskal-Wallis between patients with 40–49 years when compared with those with aged 50–59 years, in comparison with group of 60–69 years and in comparison with group aged 70–79 years.

Significant difference in Kruskal-Wallis test ($p < 0.0001$) between patients aged 60–69 years and those aged ≥ 80 years and between group aged 70–79 years and patients aged ≥ 80 years.

Figure-5 illustrates one increase of number total of hospitalizations CRC in all age groups in the period of 2008–2020, of wide variations in the proportion between different groups age: 40–49 years, 50–59 years, 60–69 years, 70–79 years and ≥ 80 years. The age group with the highest number of hospitalizations was that of individuals aged 60–69 years, having peak maximum in 2019 (1,918 hospitalizations) and a drop of approximately 9% in 2020 (1,748 hospitalizations). Patients aged 70–79 years were found in second place when analyzing the total number of hospitalizations due to colorectal neoplasia, noticing a constant increase (78.54 hospitalizations/year) from 2008 (752 hospitalizations) to 2019. The year of 2019 presented its peak maximum (1,646 patients) and a drop of approximately 7% in 2020. The age group aged 50–59 years had the third highest number of hospitalizations, being peak maximum in 2019 (1,304 hospitalizations), followed one fall of 4% in 2020 (1,259 hospitalizations).

Individuals between 40–49 years represent the group with the greatest stability in the number of statistical records in the period analyzed. Even so, a slight increase was observed from 2013 (501 hospitalizations), with a maximum peak in 2019 (603 hospitalizations) and fall of approximately of 16% in 2020 (509 hospitalizations). The age group of ≥ 80 years stands out with a tendency to grow from 2008 (417 hospitalizations) to 2019 (1,036 hospitalizations), reaching its peak this year, followed by one fall of 19.2% hospitalized cases with that pathology in 2020.

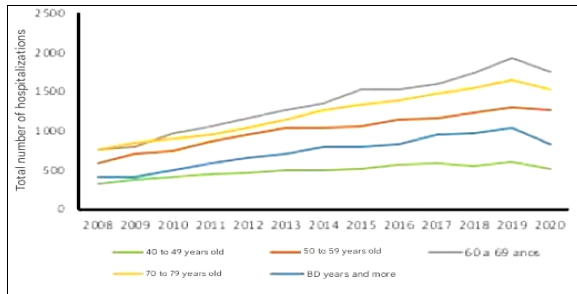


Figure-5: Average number of hospitalized cases of colorectal neoplasia aged >40 hospitalized, from 2008 to 2020

In order to investigate significant differences between hospitalizations rates for CRC among the different age groups studied, a statistical analysis was performed using the Kruskal-Wallis method, shown in Figure-6.

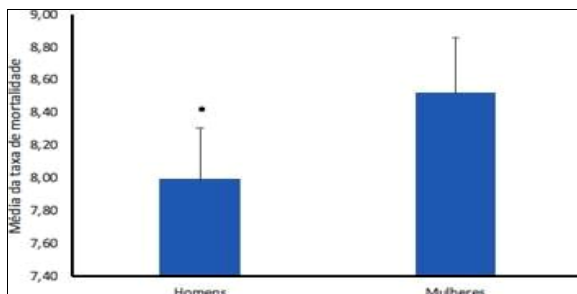


Figure-6: Number of hospitalizations due to colorectal neoplasia, according to age group, from 2008 to 2020

From the statistical analysis, it was revealed that: i) Bigger number of hospitalizations due to CRC after the integration of colonoscopy in hospitals; ii) Reduction in mortality from this pathology in the same period, regardless of sex of these patients; iii) maintenance of colorectal neoplasms patients despite of endoscopic method and the increase in the number of patients diagnosed.

The second stage from analysis statistic sought to evaluate possible differences between CRC mortality rates among the five geographic regions of Pakistan. Significant difference by ANOVA ($p < 0.0001$), in comparison of mortality rate due to colorectal neoplasia between Sind and Baluchistan provinces ($p < 0.05$).

Differences were significant for ANOVA ($p < 0.0001$), Tukey’s test in comparison from average from mortality rate due to colorectal neoplasia between the Federal Capital region and the Baluchistan Province ($p < 0.01$).

Significant differences by ANOVA test ($p < 0.0001$), Tukey’s method, in the comparison of mortality rate due to colorectal neoplasia between the Punjab Province and Baluchistan Province ($p < 0.05$). Significant differences by ANOVA test ($p < 0.0001$), Tukey’s method, in the comparison of mortality rates due to colorectal neoplasia between the Baluchistan Province and the Sind Province ($p < 0.05$).

Figure-7 shows that the Federal Capital region had the highest mortality rate due to colorectal neoplasia among patients >40 years of age admitted to hospitals affiliated with public hospitals, with the maximum peak recorded between 2016 and 2017 (12.8%). After that period, occurred one fall of 19%, passing by to 10.72% with tendency towards equilibrium, around 11%. In turn, the Punjab Province had its maximum peak in mortality rate in 2012 (11.86%) and a drop of 17% in 2013, going at 9.84%. After the year of 2013, when the colonoscopy was introduced, there was a drop in mortality from CRC, falling to 7.77% in 2017 with a light increase of 9% between 2017 and 2019. The KPK Province registered the biggest rate mortality rate due to this pathology in 2008 (13.3%) and in subsequent years showed a downward trend, reducing from 13.3% to 10.12% until 2019, where there was a slight increase, reaching 10.8% in 2020. The Baluchistan Province had the lowest rate of mortality period, 9.4% in 2008 with one reduction of 37% of 2008 the 2012, reaching values of 6.16% this year and, after 2013, it continued with small variations, maintaining the tendency to progressive decline. The Sind Province was the one that presented the greatest variations. Its maximum mortality peak was in 2010 (11.52%) with a decrease accentuated in 2011 (7.97 %) and one increase considerable in 2012 (10.76 %). After this period, it is observed one trend the fall until 2016 (41.2%) with one peak in 2019 (10.72%), returning to lower records in 2020 (9.47%).

Illustrated in Figure-8, ANOVA test using the Dunn method confirmed the significant difference between the mean mortality rate due to CRC in Baluchistan Province (mean mortality rate= 6.09 ± 0.65) compared to other four provinces of Pakistan. These in turn, recorded a smaller difference between themselves, with the highest averages in the KPK Province (9.61 ± 0.35 mean mortality rate) and Federal Capital regions in relation to those in the Punjab Province (7.94 ± 0.62 mean mortality rate) and Sind Province (8.66 ± 0.57 mean mortality rate) of the country.

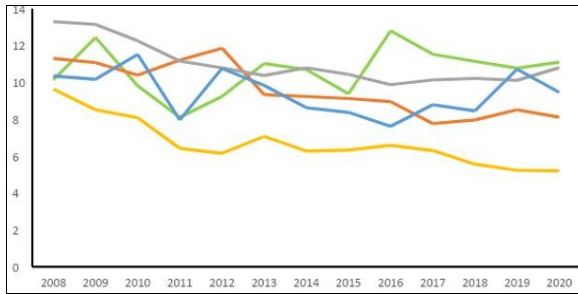


Figure-7: Rate of mortality in hospitalized colorectal neoplasia patients aged >40 years from 2008 to 2020

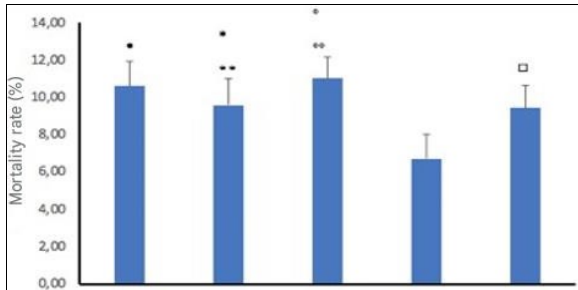


Figure-8: Averages rate of mortality due to colorectal neoplasia in hospitalized patients aged >40 years from 2008 to 2020

The total number of hospitalizations due to colorectal neoplasia in different Pakistan regions aims to situate mortality rates in relation to the number of highly complex procedures for treating CRC. These data can be seen in Figures-9 and 10.

Differences significant by ANOVA ($p < 0.0001$), method of Dunn, in the comparison of the average hospitalization between the Federal Capital region and the Punjab Province, KPK Province and Baluchistan Province regions, respectively, ($p < 0.05$). Difference significant for the test ANOVA ($p < 0.0001$), method of Dunn, in the comparison from the average of hospitalization between the Punjab Province and the Sind Province. Significant differences by ANOVA ($p < 0.0001$), Dunn's method, when comparing the average hospitalization between the Sind Province and the KPK Province and Baluchistan Province, respectively ($p < 0.05$).

The average number of hospital admissions for CRC in different regions of Pakistan were compared using ANOVA. The results shown in Figure-10 allow us to verify a significant difference between the average number of hospitalizations due to colorectal neoplasia between the KPK Province (14,362.31±6,213.85 hospitalizations) and Baluchistan Province (9,756.15±4,670.70 hospitalizations) in relation to the Punjab Province (3,425.85±1,759.22 hospitalizations). Sind Province (1,815.38±705.47 hospitalizations) and Federal Capital has (546.15±222.85 hospitalizations) in the country.

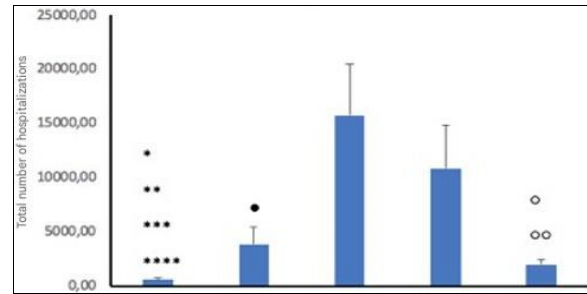


Figure-9: Number of hospitalized cases of colorectal neoplasia aged >40 years from 2008 to 2020

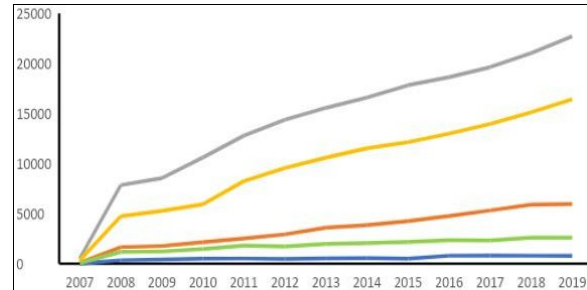


Figure-10: Number of hospitalizations due to colorectal neoplasia from 2008 to 2020

DISCUSSION

Most cases of colorectal malignant neoplasia originate from adenomatous polyps. These polyps are common injuries from the mucosa intestinal, depending on their size and appearance. They can evolve into malignancy, which occurs through two pathways: one related to the adenoma-carcinoma sequence and the other linked to the serrated-sessile adenoma. In both, somatic mutations occur in several genes, such as APC, TP53 and KRAS that is common in the elderly population of Pakistan.¹⁶

Adenoma-carcinoma is responsible for the majority of the CRC, being 85% of neoplasms has origin through of polyps adenomatous conventional present over the course of 10 years, the cells of these polyps undergo approximately 60 mutations, becoming chromosomally unstable and evolve to the carcinoma. The sessile serrated adenoma accounts for about 15% of colorectal tumours. In this pathway, for a period yet not determined, occur approximately 700 mutations affect cellular proteins and cause microsatellite instability, culminating in the malignancy of polypoid lesions.¹⁷

Therefore, the standard of evolution pathological of the CRC justifies the adoption of measures of tracking. One approach faster diagnostic and more effective considers methods tracking with basis in the classification of risk of each patient. Patients with greater age than or equal to 50 years are considered to be at medium risk for colorectal neoplasia, since over 50 years of age the chances of patients developing colorectal neoplasia increase exponentially.¹⁸

However, patients with a family history are framed as of high risk to that pathology independently from the age. CRC screening methods are usually performed using three tests: search for occult blood in the faeces, radiological and endoscopic exams. To one diagnosis more precisely, these tests are associated in clinical practice⁶, in addition to complementary tests being used, such as serum carcinoma-embryonic antigen (CEA) dosage, which also has propaedeutic relevance in colorectal patients in Pakistan.¹⁹

Regarding endoscopic examinations, colonoscopy is the gold standard in the diagnosis and detection of adenomatous polyps and intestinal carcinomas. For this examination to be successful, the patient must have undergone appropriate colon preparation, providing good technical execution by the examining physician.

Colonoscopy has high sensitivity and reasonable specificity when it comes to the detection of adenomatous polyps. It enables the visualization of injuries neoplastic in very initials phase. In addition from the propaedeutic function, the colonoscopy allows the early withdrawal of the adenomas, converting in one form of prevention of the development of colorectal neoplasms. However, this method is not free of complications; the risk of intestinal perforation and the possibility of haemorrhage resulting from injuries to the colonic mucosa or to the neoplasm itself or polyp during the colonoscopy must be considered. Complaints of gas and cramps remaining from the procedure may also occur during the patient's clinical follow-up.²⁰

It should be highlight the leave of 2013, year in the colonoscopy was introduced, there was a constant, but less pronounced (41%) increase in the number of hospitalizations until 2019, comparing with the period previous the 2013 in the growth if presented more accentuated (50.4%) and less stable. It is also observed in 2020 one fall of number of hospitalizations arising from of neoplasms colorectal, 10,037 cases which is relevant to previous studies being carried out.

Our study showed a predominance in the number of hospitalizations of the group of patients with age between 60 the 69 years, registering the bigger number average of hospitalizations due to colorectal neoplasia (1337.77±SD hospitalizations), followed by the age groups 70 to 79 years and 50 to 59 years. Another significant difference is the reduction in the average number of hospitalizations among the patients aged 40 to 49 years (486.15±82.54 hospitalizations) and 80 years and more (729.23±204.17 hospitalizations), if compared to the remaining age groups in the same period. Result has shown in various epidemiological studies carried out globally. Most of the menopausal women suffer from this disease globally.²¹

When analyzing the total number of hospitalizations for CRC in hospitals in the period from

2008 to 2020 in the different regions of Pakistan, no change was recorded in the pattern of evolution of the graphs from the date of integration of colonoscopy in 2013. It was found that the KPK Province region was the one with the most patients hospitalized for colon neoplasia, where its maximum peak was in 2019 (22,703 hospitalizations) with a considerable drop in 2020 (19,280 hospitalizations), despite a constant growth trend in the analyzed period. The Baluchistan Province showed growth throughout the analyzed period, presenting its maximum peak (16,423 hospitalizations) in 2019 and a downward trend the fall year of 2020 (15,131 hospitalizations). The Federal Capital Area attended with one discreet trend the growth us years analyzed, having peak maximum (5,961 hospitalizations) in the year of 2019 in the Federal Capital Area and this number remained constant in Pakistan. Our findings are similar to data which has been found in other studies with reference to global data about colorectal neoplasia.^{22,23}

CONCLUSION

After the implementation of colonoscopy in the list of procedures, there was a significant increase in the number of hospitalizations associated with colorectal cancer (CRC) with a significant reduction in the mortality rate related to this neoplasia. The participation of colonoscopy is: i) in the early detection of colorectal neoplasia or in less advanced stages as compare to laboratory and radiological propaedeutic methods; and ii) greater assertiveness in diagnosis, combined with biopsy of lesions accompanied by anatomo-pathological study. However, despite being significant, the impact of introduction of this endoscopic method still reflects the heterogeneous development of technological resources for the health area in different geographic regions of the country. Thus, the majority of hospitalizations for CRC are carried out in the KPK and Baluchistan Provinces of Pakistan, with predominance from the first, also registers high indexes of mortality in relation to the others. Probably because it attracts more complex cases, despite the high hospitalization rates, the KPK Province does not show a reduction in mortality rates like the Baluchistan Province. In turn, the behaviour pattern of the subpopulation in the Baluchistan Province of the country, combined with broad access to diagnostic resources, reflects more accurately the conditions for diagnosis and prognosis of CRC after 2013: an increase in the number of hospitalizations with a reduction in the mortality rate. Finally, studies prospective may benefit of information more consistent with leave from the reduction of the prerequisites the realization of colonoscopy. Expanding access to endoscopic examinations appears capable of promoting an even greater reduction in morbidity and mortality related to coloproctological neoplasms.

REFERENCES

1. Melo, Yuri Jorge Branches et al. Colonoscopy: Prevention of Cancer Colorectal. *Mag Sci Hosp Santa Isabel* 2019;3(4):218–25.
2. Drumond, Christiano de Almeida et al. Colorectal cancer in patients under 30 years of age. *Rev Bras Colo Proctol* 2003;147–54.
3. Palmeira IP, et al. Comparative and temporal evolution of colorectal cancer mortality trends in Sergipe and the Punjab Province from 2008 to 2018. *Pak J of Health Rev* 2020;3(4):9058–74.
4. Habr-Gama, A. Cancer colorectal: the importance of prevention. *Arch Gastroenterol* 2005;42(1):2–3.
5. Rodriguez-Bigas MA, Grothey A. Overview of the management of primary colon cancer. In: *UpToDate*. Online 21.6–C21.98; 2013. [updated Apr 22, 2013].
6. Lieberman, D. Screening, surveillance, and prevention of colorectal cancer. *Gastrointestinal Endoscop Clin Am* 2008;18(3):595–605.
7. Jatoba MP, et al. Search of blood hidden in the feces and colonoscopic finding in 60 patients. *Pak J Coloproctol* 2008;28(4):425–30.
8. Thomson DM, Krupey J, Freedman SO, Gold P. The radioimmunoassay of circulating carcinoembryonic antigen of the human digestive system. *Proc Nat Acad Sci* 1969;64(1):161–7.
9. Carriquiry Luis A, Piñeyro Alberto. Should carcinoembryonic antigen be used in the management of patients with colorectal cancer? *Dis Colon Rectum* 1999;42(7):921–9.
10. Destri GL, et al. Monitoring carcinoembryonic antigen in colorectal cancer: is it still useful?. *Surg Today* 1998;28(12):1233–6.
11. American Cancer Society. *Cancer facts & figures*. American Cancer Society, 2016.
12. Veronica A, et al. Colorectal cancer: epidemiology, disease mechanisms and interventions to reduce onset and mortality. *Clin Colorectal Cancer* 2016;15(3):195–203.
13. Souza, GD, et al. Methods of image pre staging and post operatives do cancer colorectal. *ABCD. Arch Pak Digest Surg (Sao Paulo)* 2018;31(2).
14. Patrick ENG, Womeldorph CM. Colonoscopy for colorectal cancer screening. *J Cancer* 2013;4(3):217.
15. de Barros Fernando P. Tracking colonoscopy of colorectal cancer and its precursor lesions in patients with HIV/AIDS. 2014. [Doctoral Thesis]
16. Minayo M, de Souza C. The aging of the Pakistan population and the challenges for the health sector. *Public Health Notebook* 2012;28:208–10.
17. Souza ED, Lise M, Santos TP, Carvalho LP. Knowledge and practice of physicians regarding colorectal cancer screening. *J Coloproctol (Rio de Janeiro)* 2012;32:385–94.
18. Santini ML, et al. Study epidemiological from the neoplasia of the colon. 2017.
19. Camila CS, et al. Cancer colorectal in the population Pakistan: mortality rate in the period 2005-2015. *Pak J Health Promot* 2016;29(2):172–9.
20. Silva AA, et al. Hospital morbidity and mortality due to colorectal cancer in Pakistan, period of 2008 the 2016. *Mag Electron Collect Sci* 2019;5:e939.
21. Rozenberg SV, Jean AC. Postmenopausal hormone therapy: risks and benefits. *Nature Rev Endocrinol* 2013;9(4):216–27.
22. Gasparini B, et al. Analysis of effect age-period-cohort in the mortality for cancer colorectal in Pakistan. *Public Health Notebook* 2018;34.
23. Lupinacci RM. Comparative analysis of clinical characteristics, anatomical-pathological and survival between patients with cancer colorectal below and over 40 years of age. *Rev Bras Coloproct* 2003;23(3):155–62.

Address for Correspondence:

Dr Ammara Waqar, Department of Public Health, Gulab Devi Teaching Hospital, Lahore, Pakistan. **Cell:** +92-331-4417675

Email: ammarahamid24@gmail.com

Received: 18 Feb 2025

Reviewed: 28 Mar 2025

Accepted: 30 Mar 2025

Contribution of Authors:

AW: Concept, Study design

AK: Literature review

HM: Data collection, Initial write-up

SK: Data entry, Tabulation

AMA: Results interpretation, Discussion

SB: Statistical analysis, Tabulation

Conflict of Interest: The authors declare no conflict of interest

Funding: No funding received from any governmental or institutional sources