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Original Article

Patterns of Care in Colorectal Carcinoma: A Retrospective Analysis from a Rural Cohort

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ABSTRACT

Background: Colorectal carcinoma (CRC) is an increasing public health challenge in low- and middle-income countries, where rural populations often experience delayed diagnosis and fragmented care. Real-world data on patterns of care from such settings remain limited.
Methods: This retrospective observational study evaluated 140 consecutive patients with histologically confirmed CRC treated between 2019 and 2023 at a tertiary care center serving a predominantly rural population. Demographic characteristics, stage at presentation, tumor site, treatment modalities, tumor marker response, and survival outcomes were analysed using descriptive statistics.
Results: The cohort comprised 94 men (67.1%) and 46 women (32.9%), with a mean age at diagnosis of 57 years. All patients were from rural areas. Advanced disease at presentation was common, with stage III (41.4%) and stage IV (17.1%) accounting for the majority; only 12.8% presented with stage I disease. The rectum was the most frequent primary site (30%), followed by the transverse (24.3%) and ascending colon (21.4%). Systemic chemotherapy formed the backbone of treatment, most commonly CAPEOX (50%), while 28.6% received radiotherapy, largely for rectal or locally advanced disease. A high proportion of patients (37.1%) were lost to follow-up, and 25.7% required multiple lines of chemotherapy. Mean overall survival was 20.7 months and mean disease-free survival was 9.7 months. Serum carcinoembryonic antigen levels showed a marked post-treatment decline, indicating partial biochemical response.
Conclusions: This study highlights substantial gaps in CRC care in rural settings, characterized by late-stage presentation, treatment discontinuity, and limited survival outcomes. Strengthening early detection strategies, improving access to multidisciplinary oncology services, and ensuring continuity of follow-up are critical to improving outcomes for rural CRC populations. These findings underscore the need for context-specific health system interventions to reduce rural–urban disparities in colorectal cancer care.

Keywords: *Colorectal carcinoma; Rectal Cancer; Patterns of care; Rural population; Survival outcomes; Low- and middle-income countries*

INTRODUCTION

Colorectal carcinoma (CRC) remains a major public health concern worldwide, with increasing incidence in low- and middle-income countries. Colorectal cancer ranks among the top three cancers in terms of both incidence and mortality, accounting for nearly 1.9 million new cases and over 900,000 deaths annually [1]. While historically CRC has been more prevalent in high-income nations, there has been a marked rise in CRC incidence within low- and middle-income countries (LMICs). This change has been attributed to shifting lifestyles, dietary changes, and increased life expectancy [2]. Early detection and evidence-based treatment significantly improve survival and quality of life [3]. In resource-rich environments, advances in screening methods, surgical techniques, and adjuvant therapies have led to significant gains in outcomes. However, substantial disparities in healthcare access, especially in rural settings, may affect patterns of presentation, treatment received, and outcomes [4]. Understanding the real-world patterns of care in such populations is crucial to bridging the gap between clinical research and everyday oncology practice.

In this study, we retrospectively analysed the demographic profile, stage at presentation, site of disease, treatment modalities, and outcomes of 140 colorectal cancer patients from a rural population. The aim was to characterize patterns of care and identify challenges in diagnosis and management within this demographic context. The primary objective was to characterize the prevailing patterns of care and to identify specific challenges encountered in the diagnosis and management of CRC within this unique demographic context.

MATERIALS AND METHODS

This retrospective observational study was conducted on 140 patients diagnosed with colorectal carcinoma over a period of 4 years from 2019 to 2023 at a tertiary care center. Data were collected from medical records, including demographic details, clinical characteristics, treatment modalities, and outcomes. Variables included age, sex, smoking status, family history, rural or urban habitation, disease site, stage at diagnosis, type of treatment received, and tumor markers (CEA levels).

All patients included in the analysis were histologically confirmed cases of colorectal carcinoma. Treatment protocols followed standard institutional and national guidelines, including chemotherapy, radiotherapy, and combination regimens based on stage and performance status. CEA levels were measured pre- and post-treatment.

Descriptive statistics were used to summarize the data. Continuous variables were represented as mean and median values, while categorical variables were expressed as frequencies and percentages.

RESULTS

Out of the 140 patients included in the study, the majority were male—94 patients (67.1%)—while 46 patients (32.8%) were female. The average age at diagnosis was fairly similar between the sexes, with males being diagnosed at a mean age of 56.9 years and females at 57.8 years.

Interestingly, all of the patients came from rural areas, highlighting a population that often faces significant barriers to timely and effective healthcare. None of the patients reported a family history of colorectal cancer, suggesting that hereditary factors may not have played a significant role in this group. However, smoking was a notable risk factor: 24 males (25.5%) and 2 females (4.3%) were identified as smokers, amounting to an overall smoking prevalence of 18.57% in the cohort.

Table1: Patient Characteristics

S.NO	PARAMETER	MALE n(%)	FEMALE n(%)	TOTAL
1	**GENDER**	94(67.1)	46(32.8)	140
2	**SMOKERS**	24(25.5)	2(4.3)	26
3	**FAMILY HISTORY**	0	0	0
4	**RURAL HABITATION**	94(100)	46(100)	140

Unfortunately, most patients presented with advanced disease. Stage III was the most commonly observed, affecting 41.42% of patients, followed by Stage II (28.57%), Stage IV (17.14%), and only a small proportion presenting at Stage I (12.8%).

Table 2: Distribution on Patients on the basis of Disease Stage

STAGE	N(140)	%
I	18	12.8
II	40	28.57
III	58	41.42
IV	24	17.14

As seen in Table 3, Rectum was the most frequently involved tumor site, seen in 30% of cases, followed by the transverse colon (24.28%), ascending colon (21.42%), rectosigmoid junction (10%), and both the sigmoid and descending colon, each accounting for 7.14% of cases.

Table 3: Distribution of Patients based on site of Primary Disease

SITE	N(140)	%
ASCENDING COLON	30	21.42
TRANSVERSE COLON	34	24.28
DESCENDING COLON	10	7.14
SIGMOID COLON	10	7.14
RECTOSIGMOID JXN	14	10.0
RECTUM	42	30.0

Treatment varied based on disease stage and individual patient factors. Chemotherapy formed the backbone of treatment across the group. Half of the patients received the CAPEOX regimen, while others were treated with Capecitabine monotherapy (28.57%), FOLFOX (19.28%), or a combination of IROX with Bevacizumab (2.14%). Radiation therapy was administered to about 28.57% of patients, likely those with rectal cancers or locally advanced disease where radiation could improve local control. Notably, around a quarter of the patients (25.7%) required multiple lines of chemotherapy, indicating disease progression or suboptimal response to initial treatment.

Table 4. Treatment Modalities Received by Patients

TREATMENT RECEIVED		N(140)	%
CHEMOTHERAPY	CAPEOX	70	50.0
	CAPECITABINE	40	28.57
	FOLFOX	27	19.28
	IROX + BEV	3	2.14
RADIATION		40	28.57
LOST TO FU		52	37.14
MULTIPLE LINES OF CHEMO		36	25.7

One particularly concerning issue was the high rate of patients lost to follow-up—an alarming 37.14% of the cohort. This substantial drop-off may reflect the complex challenges faced by rural patients, including financial constraints, long travel distances to treatment centers, and limited understanding of the importance of ongoing cancer care. Addressing these barriers will be critical to improving outcomes in similar populations.

Table 5: Survival Outcomes

OUTCOME	MEAN(M)	RANGE(M)
DFS	9.7	0-110
OS	20.7	0-120

As shown in Table 5, the mean overall survival (OS) for the entire cohort was 20.7 months, with a median OS of 9 months. The mean disease-free survival (DFS) was 9.7 months, indicating a significant proportion of patients who relapsed or failed to achieve remission.

Tumor marker analysis demonstrated a substantial reduction in serum carcinoembryonic antigen (CEA) levels following treatment, declining from an average of 26.14 ng/mL to 7.82 ng/mL. The proportion of patients with CEA levels within normal limits increased from 41 to 54 after treatment, reflecting partial biochemical response to therapy.

Table 6: Tumor Marker Response

PARAMETER	PRE TREATMENT	POST TREATMENT
AVERAGE CEA LEVEL	26.14 ng/ml	7.82ng/ml
WNL(N=70)	41	54

DISCUSSION

This study provides a critical examination of colorectal carcinoma (CRC) care patterns in a rural South Asian population, revealing substantial challenges in early detection, treatment continuity, and access to comprehensive oncology services. Our findings are consistent with existing literature from other low- and middle-income countries (LMICs) and reinforce the urgent need for public health interventions tailored to rural settings.

A key finding in our study was the predominance of late-stage disease at diagnosis, with only 12.8% of patients presenting at Stage I. This trend is consistent with evidence from South Asia showing delayed colorectal cancer (CRC) detection in rural populations. A systematic review and meta-analysis by Sepassi et al. (2024) reported that individuals from rural regions were significantly more likely to present with advanced-stage CRC, driven by limited screening access and delayed healthcare-seeking behaviour[5]. Similarly, a review by Bhatia et al. (2022) highlighted persistent rural–

urban disparities in cancer care across low- and middle-income regions, with rural patients experiencing delays in diagnosis and poorer access to timely oncologic services [6]. Collectively, these findings indicate that delayed diagnosis remains a systemic concern across rural South Asian settings, contributing to late-stage presentation and poorer outcomes.

In our cohort the most commonly involved site was the rectum (30 %), followed by the transverse and ascending colon. These findings are broadly consistent with Korean registry-based data showing predominance of rectal cancer over colon cancer in Korea, linked to dietary, genetic and regional factors [7].

A particularly concerning finding was the 37.14% loss to follow-up, underscoring a critical barrier to successful cancer care. High rates of loss-to-follow-up have been reported in other colorectal-cancer and oncology cohorts from low-resource or rural settings, highlighting a common barrier to adequate treatment and outcome measurement [8]. Interestingly, no patients reported a family history of CRC.

The mean overall survival of 20.7 months observed in this cohort reflects the cumulative impact of late-stage presentation, treatment delays, and high loss-to-follow-up rates. This survival duration is notably lower than that reported in urban or high-resource settings, where median OS frequently exceeds 36 months in stage-matched cohorts [6]. The post-treatment decline in CEA levels indicates favorable tumour response in some patients; however, the limited duration of remission highlights the need for improved surveillance and adherence to systemic therapy. These findings reinforce that early detection and continuity of care remain the most critical determinants of long-term survival in rural CRC populations.

Our findings reaffirm the need for a multifaceted strategy to improve CRC outcomes in rural populations. Awareness campaigns, decentralized diagnostic services, affordable treatment access, and robust follow-up systems are essential components of such a strategy. Moreover, integrating primary care physicians and community health workers in early symptom identification could bridge the gap between symptom onset and specialist referral.

LIMITATIONS

This study has limitations inherent to its retrospective design, including missing data and selection bias. The relatively small sample size restricts the extrapolation of findings to a larger population. Additionally, due to high loss to follow-up, survival analysis could not be meaningfully conducted. Nonetheless, the study offers critical insight into real-world challenges and healthcare delivery gaps in rural oncology practice.

Conflict of interest: No actual or potential conflict of interest exists with the authors.

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