Demographic Characteristics and Clinical Profile of Colorectal Cancer in Rural Area of Maharashtra

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ABSTRACT

Background: Colorectal cancer (CRC) stands as a formidable adversary in oncology, exerting a significant toll on global health. It is a highly prevalent malignancy that affects individuals across all age groups. According to GLOBOCAN 2022 data, CRC ranks third in incidence and second in cancer-related deaths worldwide. Colorectal cancer (CRC) is intricately influenced by array of genetic, environmental, and lifestyle factors, underscoring its complex and multifaceted nature.

Purpose: This study aims to thoroughly investigate colorectal cancer (CRC) in rural Maharashtra, India. It focuses on analysing demographic factors (age, gender, socioeconomic status), identifying key risk factors (lifestyle, diet, genetics, environment), and assessing clinical profiles (presentations, prevalence, stage at diagnosis). Through this comprehensive approach, the study seeks to enhance understanding of CRC in this region, leading to improved prevention, diagnosis, and treatment strategies tailored to the rural population.

Materials and Methods: A descriptive observational longitudinal study conducted at Pravara Rural Hospital's oncology outpatient department from June 2022 to May 2024 included all registered colorectal cancer (CRC) patients. The study enrolled 55 patients, and the collected data underwent straightforward statistical analysis.

Results:
The majority of patients in the study are middle-aged (46%), primarily aged 57-60 years, with a slight male predominance (55%). A significant portion of patients are illiterate (72%) and engaged in farming occupations. Primary risk factors include the use of smokeless tobacco (32%), high intake of red meat (89%), a low-fibre diet (50%), and low physical activity levels(. Rectal cancer cases (52%) outnumber colon cancer cases, and the prevailing histopathological type is moderately differentiated adenocarcinoma (43.64%). Advanced stage presentation, particularly at stage III (30.9%), is common, with frequent metastasis to the liver (68.75%), especially in rectal cancer cases.

Conclusion: CRC rates are rising in India, presenting a significant health challenge despite relatively low overall incidence. This trend is linked to lifestyle changes, including high-calorie, low-fibre diets, sedentary behaviour, and increased red meat consumption. The subtle early signs of CRC often lead to delayed diagnosis and poorer prognosis in advanced stages. Understanding the causes of these delays and implementing effective early detection strategies is crucial for managing the increasing burden of CRC in India.

Keywords: Colorectal Carcinoma, Epidemiology, Risk factors, Clinical Profile, Maharashtra, India

I. INTRODUCTION

Colorectal cancers are among the most prevalent gastrointestinal malignancies worldwide, incidence rates varying significantly by region. These geographic disparities are likely due to differences in diet and environmental factors. In India, the risk of colorectal cancer is highest in the Northeast, followed by the southern regions.[1]

Colorectal cancer (CRC) risk is influenced by both non-modifiable and modifiable factors. Non-modifiable risk factors include specific racial and ethnic backgrounds, for decades, it has been widely believed that India's predominantly vegetarian diet, characterized by high fibre and low meat intake, has contributed to the country's historically low incidence of colorectal cancer (CRC). However, recent trends indicate a rise in

CRC cases, even among rural populations, as dietary patterns across India undergo significant changes. This shift towards more Westernized diets, with increased meat consumption and reduced fibre intake, may be influencing the growing rates of CRC in the country. Inherited syndromes account for 2-8% of CRC cases, with Lynch syndrome (hereditary nonpolyposis colorectal cancer) and familial adenomatous polyposis (FAP) being the most common. Other hereditary conditions such as Peutz-Jeghers syndrome, juvenile polyposis syndrome, PTEN hamartoma tumour syndrome, and MUTYH-associated polyposis (MAP) also elevate CRC risk. Inflammatory bowel disease (IBD) is the third-highest risk factor following FAP and Lynch syndrome.[2,3]Conversely, modifiable risk factors include physical inactivity, obesity, smoking, alcohol consumption, and poor dietary habits. Evidence indicates that being overweight, physically inactive, smoking, drinking alcohol, and consuming a diet low in fibre, fruits, vegetables, calcium, and dairy products, but high in red and processed meats, increases CRC risk. Additionally, factors such as the gut microbiome, age, gender, race, and socioeconomic status also play significant roles in influencing CRC risk.[4]

Colorectal tumours originate in the mucosa, with the vast majority (>90%) being adenocarcinomas. Other histologic types include squamous cell carcinoma, melanoma, small cell carcinoma, carcinoid, sarcoma, and lymphoma. These large-bowel tumours invade through the bowel wall, often involving lymphatic channels and lymph nodes. Hematogenous spread typically occurs, most commonly affecting the liver.[5]

II. METHODOLOGY

Following approval from the institutional ethical committee, all diagnosed cases of colorectal carcinoma presented to the oncology department, after meeting inclusion and exclusion criteria, were included in the study. Each patient underwent a comprehensive evaluation, including detailed history-taking with emphasis on substance abuse patterns, dietary habits, family history, and thorough general and systemic examination. Haematological and relevant radiological investigations were conducted, followed by TNM staging, collected data underwent straightforward simple statistical analysis.

III. RESULTS

Our study in rural area of Maharashtra, India, 55 patients were registered in Pravara Rural Hospital's oncology outpatient department with colorectal cancer in two-year period (June 2022-May 2024). We revealed noteworthy demographic and clinical characteristics of colorectal cancer among the patient cohort. The demographic characteristics are summarized below

Age wise distribution of patients:

| Age Range (Years)	Number of patients (n=55)	Percentage (%)
<30	2	3.6
30-39	7	12.5
40-49	7	12.5
50-59	12	21.4
60-69	14	25.0
70-79	11	19.6
80+	2	3.6
Total	55	100%

The majority of patients, comprising 46%, fell within the age group of 50-69 years, reflecting a typical middle-aged profile with a mean age of 57 years and a standard deviation of 14 years.

Patient Demographics – Gender wise distribution:
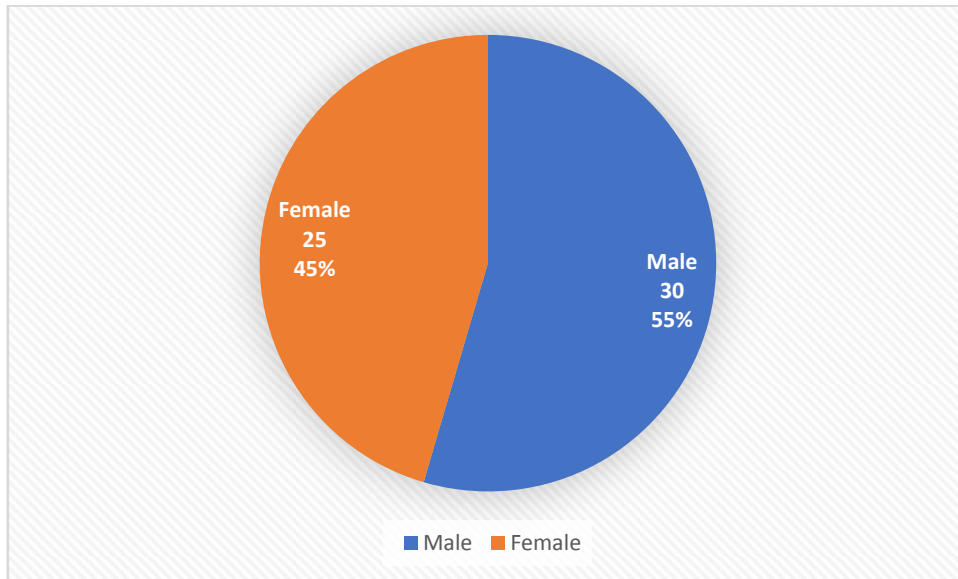
Gender distribution showed a slight male predominance, with 55% males and 45.5% females, resulting in a male-to-female ratio of approximately 1.2:1.

Occupation:
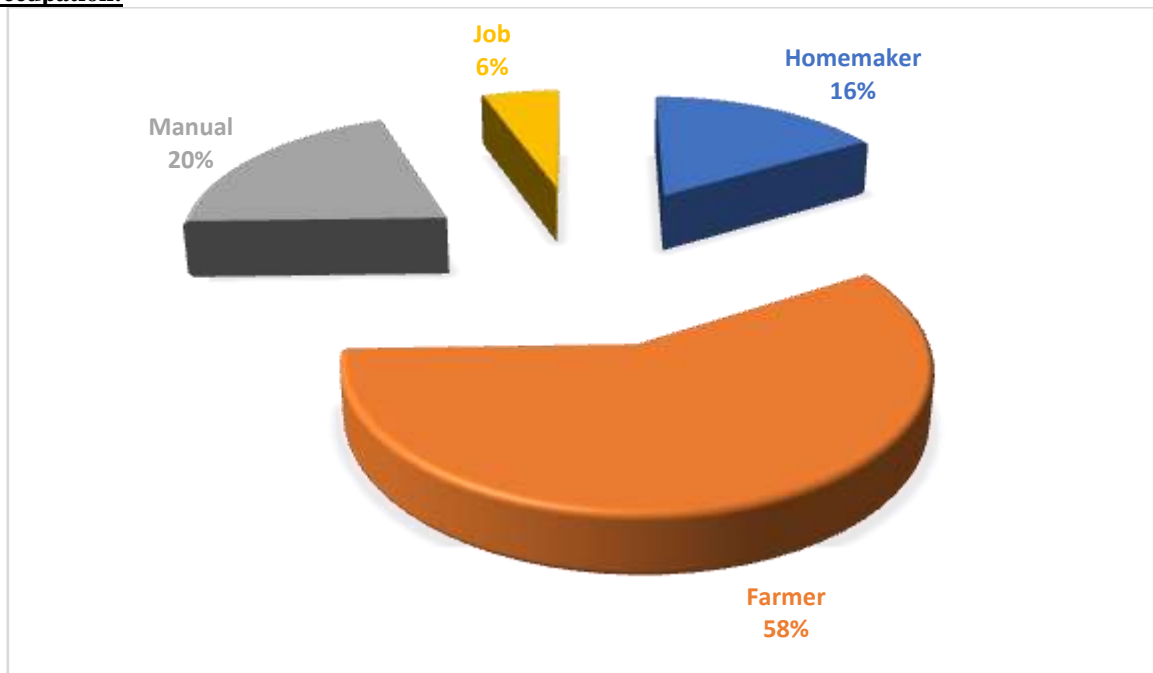
The data provides insight into the occupational distribution among 55 patients. Farmers constitute the majority, comprising 58.18% of the sample, followed by homemakers at 16.36%. Manual workers account for 20% of the patients, and individuals in jobs represent the smallest group at 5.45%.A substantial 72% were illiterate and indicative of a low socioeconomic status common in rural areas where 63% of participants resided.

In terms of general condition, the majority of patients (67.27%) exhibited a Karnofsky performance score of 80, indicating they maintained relatively normal functional ability. The prevalence of comorbidities was relatively low, with 76.36% of patients reporting no additional health conditions. Among those with comorbidities, hypertension affected 5.45% of patients, type 2 diabetes mellitus affected 7.27%, and a combination of both conditions affected 9.09%.

Family history of cancer was reported by 9.09% of patients, suggesting a lower familial predisposition within this population.

Regarding past history, the study revealed notable findings among patients. Constipation was the most frequently reported issue, affecting 26% of patients, while haemorrhoids were present in 18% of individuals. Inflammatory bowel disease (IBD) accounted for 11% of cases, indicating a notable but relatively lower incidence compared to other conditions examined. Intestinal obstruction was observed in only 1% of patients. Together, these conditions collectively affected 56% of the study population,

In terms of lifestyle choices, participants displayed distinctive habits. A significant portion, 32%, reported regular use of smokeless tobacco, while 20% used both alcohol and smokeless tobacco, and 16.36% smoked tobacco. In contrast, 27% reported abstaining from all substances. Dietary habits revealed that 89% consumed non-vegetarian, spicy, and oily foods extensively, while half of the participants reported low intake of fibre-rich foods. Furthermore, all participants, 100%, regularly consumed tea and coffee, underscoring prevalent dietary practices in the study population.

Site-wise Distribution of Patients and diet:

SITE (n=55)	Ascending colon (5)	Transverse colon (4)	Descending colon (3)	Sigmoid colon (12)	Rectum (30)	Caecum (1)
DIET						
Tea/Coffee	5	4	3	12	30	1
Veg	1	0	0	4	1	1
Egg	4	4	3	8	29	1
Non veg	4	4	3	8	29	1
Spicy food	5	4	3	12	20	1
Outside food	3	4	3	12	21	1
Oily foods	4	4	2	4	24	1
Fruits	3	3	1	5	16	1

Site wise distribution of addictions and years of addictions:

DURATION OF ADDICTION SITE WISE	ALCOHOL	SMOKED TOBACCO (ST)	SMOKELESS TOBACCO (SLT)	ALCOHOL AND ST	ALCOHOL AND SLT	SLT+ST+A	SLT+S	NO	TOTAL
ASCENDING COLON									5
10 YEARS									
20 YEARS									
30 YEARS					1				
MORE THAN 30 YEARS			3		1				
DESCENDING COLON									3
10 YEARS			1						
20 YEARS			1						
30 YEARS									

MORE THAN 30 YEARS					1			
TRANSVERSE COLON								4
10 YEARS			1				1	
20 YEARS			1					
30 YEARS			1					
MORE THAN 30 YEARS								
RECTUM								30
10 YEARS		5			2		11	
20 YEARS	2		2		2			
30 YEARS			3					
MORE THAN 30 YEARS			1		2			
SIGMOID COLON								12
10 YEARS		1	2				2	
20 YEARS								
30 YEARS								
MORE THAN 30 YEARS		3	2		2			
CAECUM							1	1
10 YEARS								
20 YEARS								
30 YEARS								
MORE THAN 30 YEARS								

Presenting Symptoms:

Symptom	Number of patients (n=55)	Percentage (%)
Rectal Bleeding	35	63.6
Abdominal Pain / Pelvic pain	40	72.7
Weight Loss	25	45.5
Altered Bowel Habits	30	54.5
Constipation	20	36.4

Among 55 patients, abdominal pain or pelvic pain (72.7%) and rectal bleeding (63.6%) emerged as the most prevalent presenting symptoms. Additional noteworthy symptoms

encompass altered bowel habits (54.5%), weight loss (45.5%), and constipation (36.4%).

Site-wise Distribution of Patients:

Site	Number of Patients (n=55)	Percentage (%)
Rectum	27	49.09%
Ascending Colon	7	12.73%
Sigmoid Colon	7	12.73%
Recto Sigmoid Junction	6	10.91%
Transverse Colon	3	7.27%
Descending Colon	3	5.45%
Ano-Rectum	1	1.82%
Caecum	1	1.82%
Total	55	100%

The data indicates that nearly half of the 55 patients (49.09%) have colorectal conditions in the rectum, making it the most frequently affected site. The ascending and sigmoid colon are equally affected, each accounting for 12.73% of the cases, followed by the recto sigmoid junction at 10.91%. The transverse and descending colon each have 3 patients (7.27% and 5.45%, respectively), while the Ano-rectum and caecum are the least affected, with only 1 patient each (1.82%). This distribution highlights the rectum and distal colon are most commonly affected.

Histopathological Types:

Histopathological Type	Number of patients (n=55)	Percentage (%)
Well Differentiated Adenocarcinoma (WD Adeno Ca)	18	32.7%
Moderately Differentiated Adenocarcinoma (MD Adeno Ca)	25	43.64%
Poorly Differentiated Adenocarcinoma (PD Adeno Ca)	2	3.64%
Mucinous adenocarcinoma	3	5.45%

Signet Ring Cell Carcinoma	3	5.45%
Squamous Cell Carcinoma	1	1.82%
Malignant Melanoma	1	1.82%
Neuroendocrine Carcinoma	2	3.64%
Total	55	100%

The histopathological analysis of 55 patients reveals that the majority have moderately differentiated adenocarcinoma (MD Adeno Ca) at 43.64%, followed by well differentiated adenocarcinoma (WD Adeno Ca) at 32.7%. Poorly differentiated adenocarcinoma (PD Adeno Ca) and neuroendocrine carcinoma each account for 3.64% of cases. Mucinous adenocarcinoma and signet ring cell carcinoma both represent 5.45%, while squamous cell carcinoma and malignant melanoma are the least common, each comprising 1.82% of the patient population. This distribution underscores the predominance of adenocarcinomas, particularly moderately and well differentiated types, in colorectal carcinoma.

Stage at First Visit:

Stage	Number of patients (n=55)	Percentage (%)
Stage I	5	9.09
Stage II	14	25.45
Stage III	20	36.36
Stage IV	16	29.09
Total	55	100%

The staging distribution of 55 patients with colorectal conditions reveals that the largest group is at Stage III, comprising 36.36% of the patients. Stage IV follows closely with 29.09%, indicating a significant number of patients with advanced disease. Stage II accounts for 25.45% of the cases, while Stage I has the fewest patients at 9.09%. This data highlights that a substantial proportion of patients are diagnosed at later stages (Stage III and IV), which may suggest a need for earlier detection and intervention strategies to improve outcomes.

Metastasis wise distribution of patients

SITE	Number of patients (n=16)
LIVER	11
LUNG	1
LIVER, ADRENAL, LUNG	1
LIVER, LUNG, SKELETAL	1
NODAL METASTASIS	2
TOTAL	16

In the cohort of 55 patients, 16 patients had metastasis. The liver is the most frequent site, with metastasis observed in 11 patients. Additionally, there is one case each of metastasis solely to the lung and combined metastasis involving the liver, adrenal gland, and lung, and another case involving the liver, lung, and skeletal system. Nodal metastasis is present in 2 patients. This data highlights the liver as the primary site for colorectal cancer spread, emphasizing its critical role in metastatic colorectal cancer management and the necessity for comprehensive evaluation to detect possible multi-organ involvement.

IV. DISCUSSION

The likelihood of developing colorectal cancer is approximately 4%–5%. The risk factors for colorectal cancer include molecular alterations, age, chronic disease history, and lifestyle habits.[6]

The primary risk factor for colorectal cancer is age, with a significant increase in risk after the fifth decade of life. The risk continues to rise with advancing age. In our study, 46% of patients were aged between 50-69 years, reflecting a typical middle-aged profile, with a mean age of 57 years and a standard deviation of 14 years. These findings are consistent with the studies by Gupta et al. and Patil P et al.The gender distribution indicated a slight male predominance, with 55% males and 45.5% females, resulting in a male-to-female ratio of approximately 1.2:1. These findings are consistent with studies by Gupta et al. and Patil P et al.[7,8]

The majority of patients (67.27%) had a Karnofsky performance score of 80, indicating relatively normal functional ability. Comorbidities were infrequent, with 76.36% reporting none. Hypertension affected 5.45% of patients, type 2 diabetes mellitus 7.27%, and both conditions combined affected 9.09%. Additionally, 9.09% of patients had a family history of cancer, indicating a lower familial predisposition in this group.

The study revealed significant findings in patients past medical history. Constipation was the most common issue, affecting 26% of patients, followed by haemorrhoids in 18%. Inflammatory bowel disease (IBD) was present in 11% of cases, showing a notable but lower incidence. Intestinal obstruction was rare, affecting only 1% of patients. Collectively, these conditions impacted 56% of the study population, highlighting the prevalence of gastrointestinal issues among the patients.These findings highlight the importance of not ignoring such complaints. General practitioners should promptly address and thoroughly evaluate symptoms like constipation, haemorrhoids, altered bowel habits and other gastrointestinal issues to ensure timely diagnosis and treatment.

In our study, 89% of patients consumed non-vegetarian, spicy, and oily foods daily, mainly chicken and mutton. This is consistent with findings by Jain et al., who reported an 81% preference for non-vegetarian diets among GI malignancy patients. The prevalence of meat consumption reflects cultural habits in this rural area, where only 12% follow vegetarian diets. Similarly, Jain et al. (2019) found that only 16% of rural individuals adhere to a vegetarian diet. [9]

Regarding substance use, 32% of participants used smokeless tobacco, making it the most common form. Additionally, 20% used both alcohol and smokeless tobacco, 16.36% used smoked tobacco, and 3.63% consumed alcohol alone. Notably, 27% had no addictions. Jain et al. also reported high rates of smokeless tobacco use in rural areas. Furthermore, 27% of patients had addictions lasting over 30 years.[9]

In our study, the most prevalent symptoms were abdominal/pelvic pain (72.7%) and rectal bleeding (63.6%), followed by altered bowel habits (54.5%), weight loss (45.5%), and constipation (36.4%). Patients reported symptoms for 6 to 12 months, highlighting a delayed presentation typical of colorectal cancer. In contrast, a study by Prachi P et al. reported a median symptom duration of 4 months, with rectal bleeding (56.5%), pain (44%), and altered bowel habits (25.6%) being the most common.[8]

In our study of 55 patients, the rectum was the most commonly affected site (49.09%), followed by the ascending and sigmoid colon (12.73% each), rectosigmoid junction (10.91%), transverse and descending colon (7.27% and 5.45% respectively), and the ano-rectum and caecum (1.82% each). Similarly, Prachi P et al. found the rectum to be the most prevalent site (42%), followed by the rectosigmoid (21%), anorectum (13%), and colon (25%), with 18% of tumours in the right colon. Both studies highlight the rectum as the primary site of colorectal cancer, reflecting consistent patterns across different populations and methodologies.[8]

Our study of 55 colorectal cancer patients revealed that the most common histopathological type was Moderately Differentiated Adenocarcinoma (43.64%), followed by Well Differentiated Adenocarcinoma (30.91%). Less common types included Poorly Differentiated Adenocarcinoma and Neuroendocrine Carcinoma (each 3.64%), as well as Mucinous Adenocarcinoma, Signet Ring Cell Carcinoma, Squamous Cell Carcinoma, and Malignant Melanoma. In comparison, Prachi P et al. reported 47.6% with moderately differentiated adenocarcinoma, 2.6% with well-differentiated, and 20.6% with poorly differentiated adenocarcinoma, with 13.4% having signet ring cell carcinoma and 16.6% mucinous carcinoma. These variations likely reflect differences in patient populations, geographical locations, sample sizes, and diagnostic methodologies.[8]

In our study, initial staging assessments at patients' first visits revealed significant proportions of Stage III (30.9%) and Stage IV (29.09%) colorectal cancer diagnoses. Stage II and Stage I diagnoses were noted at 23.63% and 3.63%, respectively, highlighting a substantial number of patients with advanced disease stages totalling 60%. Similarly, Prachi P et al. reported comparable findings, with 50.7% presenting at Stage III, 28.8% at Stage IV, and a small percentage (3.8%) at Stage

I. This underscores the prevalence of advanced disease presentations in both studies. [8]

In our study, 29.09% of patients were diagnosed at Stage IV, consistent with findings by Qiu M. et al. Among these patients, liver metastasis was observed in 11 individuals (68.75%). Additionally, one patient (6.25%) had lung metastasis, while another (6.25%) exhibited metastases in the liver, adrenal gland, and lung. Furthermore, one patient (6.25%) showed metastases in the liver, lung, and skeletal system. Finally, nodal metastasis was found in two patients (12%).[10]

V. CONCLUSION

Colorectal cancer (CRC) rates are increasing in India, posing a growing challenge to cancer morbidity despite the relatively low absolute rates. This rise is linked to shifting lifestyles marked by high-calorie, low-fibre diets, increased consumption of red meat and processed foods, and reduced physical activity. CRC includes cancers of the colon and rectum, often diagnosed late due to subtle early symptoms. Symptoms like changes in bowel habits, abdominal pain, and rectal bleeding are commonly misinterpreted, leading to delayed diagnosis. This delay significantly affects prognosis, as early-stage CRC has much higher survival rates compared to advanced stages. Therefore, identifying factors contributing to delayed diagnosis and implementing early detection strategies are crucial for improving CRC outcomes.

REFERENCES

[1]. Asthana S, Khenchi R, Labani S. Incidence of colorectal cancers in India: A review from population-based cancer registries. Curr Med Res Pract. 2021;11(2):91-96. doi: 10.4103/cmrp.cmrp_65_20.

[2]. Jasperson KW, Tuohy TM, Neklason DW, Burt RW. Hereditary and familial colon cancer. Gastroenterology. 2010 Jun;138(6):2044-58. doi: 10.1053/j.gastro.2010.01.054. PMID: 20420945; PMCID: PMC3057468.

[3]. Gryfe R. Inherited colorectal cancer syndromes. Clin Colon Rectal Surg. 2009 Nov;22(4):198-208. doi: 10.1055/s-0029-1242459. PMID: 21037810; PMCID: PMC2796102.

[4]. Sawicki T, Ruszkowska M, Danielewicz A, Niedźwiedzka E, Arłukowicz T, Przybyłowicz KE. A Review of Colorectal Cancer in Terms of Epidemiology, Risk Factors, Development, Symptoms and Diagnosis. Cancers (Basel). 2021 Apr 22;13(9):2025. doi:10.3390/cancers13092025. PMID: 33922197; PMCID: PMC8122718.

[5]. Martin TA, Ye L, Sanders AJ, et al. Cancer Invasion and Metastasis: Molecular and Cellular Perspective. In: Madame Curie Bioscience Database [Internet]. Austin (TX): Landes Bioscience; 2000-2013. Available from: https://www.ncbi.nlm.nih.gov/books/NBK164700/

[6]. Mármol I, Sánchez-de-Diego C, PradillaDieste A, Cerrada E, Rodriguez Yoldi MJ. Colorectal Carcinoma: A General Overview and Future Perspectives in Colorectal Cancer. International Journal of Molecular Sciences. 2017; 18(1):197. https://doi.org/10.3390/ijms18010197

[7]. Gupta N, Verma S, Negi M, Devi S. Demographic profile and clinicopathological patterns of colorectal cancer in Subhimalayan North India. Bengal J Cancer. 2021;1(1):19-25. doi:10.4103/bjoc.bjoc_18_21.

[8]. Patil PS, Saklani A, Gambhire P, Mehta S, Engineer R, De'Souza A, Chopra S, Bal M. Colorectal Cancer in India: An Audit from a Tertiary Center in a Low Prevalence Area. Indian J Surg Oncol. 2017 Dec;8(4):484-490. doi: 10.1007/s13193-017-0655-0. Epub 2017 Apr 22. PMID: 29203978; PMCID: PMC5705504.

[9]. Jain VS, Kawale D, Jain SM, Waghmare C, Pemmaraju G. Various addiction patterns, dietary habits, associated medical problems, and socioeconomic status in gastrointestinal malignancies: A prospective study in rural area of Maharashtra, India. J Cancer Res Ther. 2019;15(1):104-7. doi:10.4103/jcrt.JCRT_925_17.

[10]. Qiu M., Hu J., Yang D., Cosgrove D. Peter, Xu R. Pattern of distant metastases in colorectal cancer: a SEER based study. Oncotarget. 2015;6:38658-38666. Available from: https://www.oncotarget.com/article/6130/text/