

# Demographic and Clinicopathological Patterns of Colorectal Cancer at the National Cancer Institute, Sudan

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## Abstract

**Background:** Colorectal cancer is a common type of cancer worldwide, including in Sudan. However, few studies have assessed its demographic, clinical and pathological patterns in the Sudanese population.

**Objective:** To assess the demographic, clinical and pathological patterns in patients with colorectal cancer at National Cancer Institute, University of Gezira, Sudan.

**Methods:** This retrospective, cross-sectional study analyzed the data of all colorectal cancer patients who presented to National Cancer Institute, University of Gezira, between January 2016 and December 2017. National Cancer Institute, University of Gezira, is one of the two National Cancer Institutes in Sudan and receives patients from across Sudan. The demographic, clinical and pathological information were extracted from the patients' files.

**Results:** A total of 163 colorectal cancer patients who presented to National Cancer Institute during the study period and met the inclusion criteria were included in this study. Most patients were aged >40–69 years (58.8%), were male (53.4%) and from Central Sudan (65.6%). About 44% of the patients were diagnosed 6–12 months from the disease onset and 26.8% after >12 months. Change in bowel habits (51.5%), rectal bleeding (42.3%) and abdominal pain (32.5%) were the most common clinical presentations. About 58% of the patients did not undergo per rectal examination during their initial presentation. Rectum was the most common site of tumor (58.9%), and the majority of patients had Grade I adenocarcinoma (50.3%). Duke's Class B (38%) and Class C (31%) were the most common stages of the patients' tumor, and signet ring carcinoma was found in 4.9% of the patients.

**Conclusion:** This study found that in Sudan, colorectal cancer patients most commonly present late after the onset of symptoms, with an advanced stage and aggressive pattern as well as the proportion of younger patients is high. Further, per rectal examination is often not performed during the initial presentation.

**Keywords:** Clinicopathological, colorectal cancer, demographic, Gezira, presentation, Sudan

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## INTRODUCTION

Colorectal cancer is a common cancer worldwide, accounting for 10.2% of all new cancer cases in 2018.<sup>[1]</sup> It is the third most common cancer (with 1.80 million cases)

and the second leading cause of cancer-related mortality (862,000 deaths) worldwide.<sup>[2]</sup> The incidence rates of colorectal cancer are highest in Australia and New Zealand followed by Europe, Eastern Asia and Americas.<sup>[1]</sup>

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In Sudan, although colorectal cancer is the fourth most common cancer, accounting for 5.4% of all new cases in 2018, it has received less attention.<sup>[3]</sup> In terms of cancer, most of the Government efforts have been prioritized toward fighting breast cancer, owing to its heavier burden.<sup>[3]</sup> Although incidence data on colorectal cancer from Sudan are available, demographic, clinical and pathological data are not unavailable.

Previously, a study from National Cancer Institute, University of Gezira (NCI-UG), Sudan, assessed the clinical presentation in colorectal cancer patients between 2006 and 2011 and found that 58% of the patients presented at a late stage of the disease, and about 97% had rectal bleeding.<sup>[4]</sup> However, as disease trends may change over time, the current study was carried out with the objective of providing newer data regarding the demographic, clinical and pathological patterns of colorectal cancer in the Sudanese population. Understanding these patterns would help strategize effective screening programs, which in turn may result in the early diagnosis of the cancer and detection of adenomatous polyps.<sup>[5]</sup>

## METHODS

### Study design

To assess the demographic and clinicopathological pattern of colorectal cancer in Sudan, this retrospective, cross-sectional, hospital-based study analyzed the data of all colorectal cancer patients who presented to NCI-UG between January 2016 and December 2017. This study was approved by the Research Committee of NCI-UG.

### Study setting

NCI-UG is one of the two NCIs in Sudan. It is located in Wad Madani, Gezira State, Sudan, and is considered a training and educational center for oncology trainees and a treatment hospital for Sudanese cancer patients. NCI-UG is a tertiary center for cancer cases and receives patients from across Sudan; therefore, data from this institute are representative of Sudan.

### Study population and data collection

The study included the data of all patients with colorectal cancer who presented to NCI-UG between January 2016 and December 2017. The patients had various stages of cancer, and the majority patients had undergone different types of bowel surgery at different hospitals. Patients with <80% of the data were considered to have incomplete information and were excluded from analyses. Demographic data of the patients (i.e., age, gender and

education level) as well as the clinical and histopathological patterns were assessed.

### Statistical analysis

Data were analyzed using SPSS version 20 (IBM, Armonk, NY, USA). All data are presented as simple frequencies and percentages.

## RESULTS

A total of 178 colorectal cancer patients presented to NCI-UG between January 2016 and December 2017. Of these, 15 patients had incomplete data and were excluded; therefore, the final analysis included 163 patients. The majority of the patients were male (53.4%). About 55% of the patients were aged  $\geq 50$  years, and among all age groups, it was most common in those aged 60–69 years (20.8%) [Table 1]. Further, majority of patients in this study underwent different types of bowel surgery and neoadjuvant therapies.

In terms of geographical distribution, the majority of the patients were from Central Sudan (65.6%), whereas only 2% were from South Sudan. In terms of history, 14% of the patients had a positive family history of colorectal

**Table 1: Demographic and clinical data of patients diagnosed with colorectal cancer**

Characteristics	n (%)
Gender	
Male	87 (53.4)
Female	76 (46.6)
Age (years)	
<20	2 (1.2)
20-29	13 (8)
30-39	27 (16.6)
40-49	32 (19.6)
50-59	30 (18.4)
60-69	34 (20.8)
$\geq 70$	25 (15.4)
Education	
Illiterate	55 (33.7)
Primary school	48 (29.4)
Secondary school	30 (18.4)
University level	26 (16)
Postgraduate level	4 (2.5)
Locality	
Central Sudan	107 (65.6)
East Sudan	26 (16)
West Sudan	10 (6.1)
North Sudan	16 (9.8)
South Sudan	4 (2.5)
Family history of colorectal cancer	
Positive family history	23 (14.1)
No family history	122 (74.8)
Missing data	18 (11.1)
History of colorectal cancer	
Yes	19 (11.7)
No	118 (72.3)
Missing data	26 (16)

cancer and 11.7% were recurrent cases. Differences in gender, age, education and family history of colorectal cancer is summarized in Table 1.

Most patients (44.3%) were diagnosed with colorectal cancer in 6–12 months from the onset of symptoms, while 26.8% were diagnosed after >1 year; only 8.9% of the patients were diagnosed within 1 month of the disease onset. In terms of clinical presentations, change in bowel habits (51.5%) was the most common presentation followed by rectal bleeding (42.3%) and abdominal pain (38%). Gastroenteritis (43.2%) was the most common provisional diagnosis at the initial presentation, whereas colorectal cancer was the initial diagnosis in only 13.5% of the patients. Further, about 53.4% did not have per rectal examination during their first medical encounter. At the rectal examination (during the initial or subsequent visit), about 33.8% of the patients were found to have a palpable, often fungating, mass. In addition, rectum was the most common site of tumor (58.9%), and the majority of patients (50.3%) had a histological Grade 1 tumor and 24% of histological Grade 3. Duke's Class B and Class C were the most common stages of the patients' tumor (38% and 31.3%, respectively) [Table 2].

## DISCUSSION

Colorectal cancer is a common cancer worldwide that affects both genders and all ages.<sup>[6]</sup> In Sudan, it is the fourth most common type of cancer;<sup>[3]</sup> however, few studies had assessed demographic, clinical and pathological patterns of colorectal cancer in the Sudanese population. Accordingly, the current study found that in this population, colorectal cancer is the most common in those aged 60–69 years but is almost equally distributed among all age groups aged 30–39 years and above. This study also found that most patients in Sudan present late after the onset of colorectal cancer, which represents a challenge to achieve favorable treatment outcomes.

In the current study, about 26% of the patients with colorectal cancer were aged <40 years. This finding is in line with that of Gado *et al.*,<sup>[7]</sup> who found that in Egypt, about 25% of colorectal cancer patients are aged <40 years. Further, about 45% of the patients in the current study were aged <50 years, while in Saudi Arabia and United States, the percentage of colorectal cancer patients aged <50 years is 37% and 11%, respectively.<sup>[8,9]</sup> Therefore, these findings suggest that in Arab countries, a larger percentage of colorectal cancer patients are younger compared with that in Western countries. It should be noted that colorectal cancer in those aged <40 years is

**Table 2: Clinical and pathological findings**

Characteristics	n (%)
Patients' symptoms and signs*	
Change of bowel habits	51.5
Rectal bleeding	42.3
Abdominal pain	38
Weight loss	32.5
Blood mixed with stool	20.2
Tenesmus	11
Anemia	8
Initial diagnosis at time when patient sought first medical advice	
Gastroenteritis	69 (42.3)
Hemorrhoid	27 (16.6)
Colorectal cancer	22 (13.5)
Others	25 (15.3)
Missing information	20 (12.3)
Per rectal examination during the first medical consultation	
Yes	63 (38.7)
No	87 (53.4)
Missing data	13 (7.9)
Medical visit in which per rectal examination was carried out (n = 87)	
Second	15 (17.2)
Third	13 (15)
Fourth	20 (23)
Not mentioned	39 (44.8)
Site of the tumor	
Right colon	18 (11.1)
Transverse + left colon	16 (9.8)
Sigmoid	14 (8.6)
Rectosigmoid junction	5 (3.1)
Rectum	96 (58.9)
Anal canal	9 (5.5)
Synchronous bowel tumor	5 (3)
Findings of per rectal examination	
Palpable rectal mass	55 (33.8)
Normal	32 (19.6)
Other abnormalities	16 (9.8)
Missing information	60 (36.8)
Histological grade of the tumor	
Grade 1	82 (50.3)
Grade 2	38 (23.3)
Grade 3	39 (24)
Missing information	4 (2.4)
Type of cancer cells in histopathology result	
Glandular	101 (62)
Mucinous	25 (15.3)
Tubular	3 (1.9)
Papillary	4 (2.4)
Signet ring	8 (4.9)
Mixed	8 (4.9)
Missing information	14 (8.6)
Dukes classification of the tumor	
Class A	29 (17.8)
Class B	62 (38)
Class C	51 (31.3)
Class D	7 (4.3)
Missing information	14 (8.6)

\*There are more than one sign for one patient

associated with poor prognosis.<sup>[10]</sup> In the current study, the rare signet ring type of adenocarcinoma was found in 4.9% of the patients, all of whom were aged <35 years and had very aggressive patterns. These findings were higher than that by Abdulkareem *et al.*,<sup>[11]</sup> who found that in Lagos and Sagamu, Nigeria, the rate of signet ring type was 1.2%.

As stated earlier, most patients in Sudan presented from 6 months to >1 year after the onset of disease symptoms, which is similar to that observed in Saudi Arabia.<sup>[12]</sup> As the majority of the patients in this study were illiterate or had low education levels (i.e., lesser than university level), the delay in presentation could be because of poor education resulting in low health knowledge. In addition, there is lack of standard health facilities for diagnosing colorectal cancer; therefore, patients have to travel to access adequate facilities, which may also be resulting in delayed diagnosis. In this study, 46% of the patients were incorrectly diagnosed with gastroenteritis disease and 53% did not undergo per rectal examination during their first medical consultation despite their lower gastrointestinal tract symptoms. These findings highlight the lack of training in making a correct diagnosis of colorectal cancer, thereby resulting in delayed diagnosis.

The most common presenting symptoms were change in bowel habits (51.5%) followed by rectal bleeding (42.3%), which is the leading cause of anemia in these patients. Studies from Saudi Arabia and Egypt found that about 6% and 9% of colorectal cancer patients had a positive family history, respectively.<sup>[13,14]</sup> As the current study found that about 14% of the patients had a positive family history, it indicates that in Sudan, the association between colorectal cancer and a positive family history is stronger than that of its neighboring countries. Therefore, the authors recommend further studies to assess the genes in Sudanese population that may predispose to colorectal cancer.

In this study, the number of colon and rectal cancer cases were 22 and 71, respectively, in 2016 and 26 and 44 cases, respectively, in 2017. Specifically, the most common site of the carcinomas was rectum (58.9%) followed by sigmoid (8.6%). This finding differs with the site distribution of colorectal carcinomas reported from developed countries,<sup>[15]</sup> where distal colon was found to be affected in 53% of the cases and rectum in only 25%. In terms of pathology, the most common histological grade of the tumor in this study was Grade 1 adenocarcinoma (50.3%), while in Egypt, Grade 2 adenocarcinoma is the most common grade.<sup>[16]</sup> It should be noted that low-grade cancer is associated with better surgical outcomes and higher quality of life compared with higher grade cancers.

Glandular type adenocarcinoma (62%) was the most common type in this study followed by mucinous type (15.3%); signet ring type accounted for 4.9% of the cases. A study from Nigeria found that 17% of the patients had the mucinous type, which was slightly more than that observed in this study, while signet ring type accounted

for only 2%.<sup>[17]</sup> Similarly, other studies have shown that signet ring type comprises only about 1% of all colorectal carcinomas.<sup>[11,18,19]</sup> Signet ring carcinoma is unamenable for surgery in many cases, and thus the percentage of population found in the current study is considered high, especially compared with other African regions. In terms of the classification, about 38% of patients presented with Duke's B and 31.3% with Duke's C colorectal cancer. These findings are higher than that found in Saudi Arabia, where Duke's B and C colorectal cancers constituted 21.9% and 29.7%, respectively, of all cases,<sup>[12]</sup> but lower than found in Egypt, where Duke's C constituted 51.7% of all cases.<sup>[16]</sup>

In addition to the general limitations of a retrospective study, this study only included colorectal patients from a single institute and thus has a relatively moderate sample size. As assessing the data of colorectal cancer with wide geographical area is necessary, the authors recommend a national, multicenter study to consolidate the findings of this study and provide precise region-specific data.

## CONCLUSION

This study found that in Sudan, colorectal cancer patients most commonly present late after the onset of symptoms, with an advanced stage and aggressive pattern as well as the proportion of younger patients is high. In addition, colorectal cancer was commonly misdiagnosed, and per rectal examination was often not performed during the initial presentation. Therefore, the authors recommend that policymakers should raise awareness among family physicians regarding the importance of complete clinical examination and assessment, including of per rectal examination. The authors also suggest adoption of international colorectal cancer screening programs in Sudan, especially among those presenting with its lower gastrointestinal tract symptoms.

## Ethical considerations

Ethical approval for this study was obtained from the Research Committee of NCI-UG, on June 6, 2018. Formal informed consent is not required for this type of study, and for ethical reasons, the data has been completely anonymized.

## Peer review

This article was peer reviewed by three independent and anonymous reviewers.

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**Conflicts of interest**

There are no conflicts of interest.

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