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The Burden of Colorectal Cancers in Nigeria: Patterns and Presentations in North-Eastern Nigeria

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Abstract

Background: Colorectal Cancer(CRC), previously considered a rarity in the African, especially, black African, has dramatically increased in incidence among indigenous African people over the last six decades. The West African subcontinent, Nigeria inclusive, has been affected by such increase. Recent reports from Ibadan and Ile-Ife Southwest of Nigeria has affirmed to this increase. Reports from Jos, North-central of Nigeria also indicated same. There is however, a dearth of recent data from the North-east of Nigeria highlighting the current state.

Objectives: This study was designed to probe the current incidence, particularly, the age-related incidence and the anatomical site related burden of CRC.

Patients and Methods: A prospective cross-sectional study of 65 patients that presented at the General surgery unit of the State Specialist Hospital Damaturu, Yobe state, Nigeria. It is an 8-year study of patients that presented with clinically and histologically diagnosed CRC, between 2006-2013. Patients' characteristics studied included the age, gender, anatomical site of diagnosis, clinical stage, histopathologic diagnosis and grade, surgery and palliative care offered and the overall 5-year survival. Informed consent was obtained according to the Helsinki guidelines and Ethical clearance was given by the hospital management.All data obtained was assessed using the Statistical Package for Social Sciences, version 20.0 (IBM, Armonk, NY, USA).

Results:A total of 65 patients were studied. 44(67.7%) were males and 21(32.3%) were females, with a male-female ratio of 2:1.The mean age was 50.5, with an age range of 16-79 years. The peak age of occurrence of CRC is 45-65 years. The most common of CRC in North-eastern Nigeria is rectal cancer (33.8%), Anorectal cancers (21.5%) and sigmoid colonic cancers at 15.4%. Right sided colonic tumours constituted 15.4% with predominance of caecal pole tumours (10.8%). The least common phenotypes were Transverse colonic (3.1%), ascending colonic, descending colonic and recto-sigmoid cancers, at 4.6% each. Only 49.2% of the patients presented early.About 41.5% presented with locally advanced disease, majority with malignant bowel obstruction. About 9.2% of the patients presented with metastatic disease. Adenocarcinoma is the most common histological variant (86.2%), followed by Gastro-intestinal Stromal Tumours (GIST) at 4.6%. all the remaining histological variants like, Lymphoma, Epidermoid Carcinoma, Cloacagenic Carcinoma, Small and Large cell carcinoma, occurred at almost same frequency of 1.5%. About 41.5% are well differentiated carcinoma and a relatively significant proportion is either poorly differentiated (16.9%) or other biologically aggressive subtypes; Mucin secreting at 10.8% and Signet ring type at 4.6%. Anterior resection with or without total Meso-rectal excision is the most common curative surgery(29.3%), Paul Muckliz colostomy is the most common procedure for those with locally advanced disease and Malignant bowel obstruction (10.8%). Palliative drainage with or without concurrent sclerotherapy was the most common procedure for those with malignant exudative fluid collections.Although, only 20% of the patients for 5 years and above after treatment, up to 87.4% were alive 3 years after treatment and majority are the young folks.

Conclusion: There is an evident increase in the incidence of CRC in the North-east of Nigeria, like the rest of the country, with male preponderance and rectal cancer predominance. Colonic cancers are still rare as compared to the western world and are seen in much younger age group in North-eastern Nigeria. More than half of the patients presented with advanced disease.

Keywords

Colorectal cancers, Increasing incidence, Advanced disease, North-East Nigeria

Introduction

The World Health Organisation in 2008 estimated that Cancer was the leading cause

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of death globally, responsible for the deaths of an estimated 7.6 million people[1]. CRC accounted for over 600, 000 of those deaths, with 70% occurring in developing countries[2].The crude incidence of CRC in sub-Saharan Africa is estimated at about 4.04/100,000 population[3].

The burden of CRC was considered to be remarkably low in the African continent, particularly,in the black African population[4,5]. The dietary compliment of the black African population, rich in fibres, is thought to have preventive effect[6].The fibres increase the bulk of the stool, reduce transit time and dilute the total proportion of carcinogenic faecal bile acid and limit its contact with the colonic mucosa. This is also proposed as the cause of high burden of rectal carcinoma in the African population[7].The rarity of premalignant lesions, such as colonic adenomatous polyps and Inflammatory Bowel Disease is also alluded to[4,5].

Recent reports have indicated a departure from this. There is increasing evidence that CRC is in progressive rise in incidence[8].The purported shift in the anatomical site of occurrence to the right colon is strongly disputed, as most reports indicated the preponderance of Rectal cancers, particularly in the West African subregion[9,10]. However, there is piling evidence that those premalignant adenomatous polyps are on the rise and more right sided tumours are seen in the African patient than before, especially with increasing availability of Endoscopic assessment.[18-22]

Late presentation has featured prominently in most reports from Africa[11].The lack of robust screening programmes, high cost of treatment and lack of access to efficient health care were given as some of the causes[8,12].The presence of large pool of Adenocarcinoma with an aggressive biological profile is also implicated, especially, a large number of Mucinous and Signet ring types[8,9].

What has not changed is the relative younger age of African patients compared to the industrialised nations. Many studies showed an average age of between 43-46 years (Peak age 50-60 years) except for a rare report from Ghana, which reported an average age of 58 years (Peak age 70-80 years)[13-15].The CRC in the young is said to be also biologically aggressive and may contribute to the late presentation[16,17].

Age	Frequency	Percent
16-25 years	9	13.8
26-35 years	11	16.9
36-45 years	14	21.5
46-55 years	12	18.5
56-65 years	11	16.9
66-75 years	4	6.2
75 years and above	4	6.2
Total	65	100.0

Table 1: Showing the age distribution of the patients

Anatomical Site	Frequency	Percent
Caecal Pole Cancer	7	10.8
Ascending Colon Cancer	3	4.6
Transverse Colonic Cancer	2	3.1
Descending Colonic Cancer	3	4.6
Sigmoid Colonic Cancer	10	15.4
Rectal Cancer	22	33.8
Recto-Sigmoid	3	4.6
Anorectal Cancer	14	21.5
Anal	1	1.5
Total	65	100.0

Table 2: Showing the anatomical site distribution of CRC

Patients and Methods

This is a prospective cross-sectional study of 65 patients that presented at the General surgery unit of the State Specialist Hospital Damaturu, Yobe state, Nigeria. It is an 8-year study of patients that presented with clinically and histologically diagnosed CRC, between 2006-2013. Patients' characteristics studied included the age, gender, anatomical site of diagnosis, clinical stage, histopathologic diagnosis and grade, surgery and palliative care offered and the overall 5-year survival. Digital rectal examination and flexible colonoscopy were used to identify the anatomical site of the tumour. Basic Haematoxylin and Eosin staining was used for histological diagnosis except for GIST where immunohistochemistry was used for c-kit CD117 biological marker. A purposive random sampling was used in patients' selection. All patients above 16 years of age (15 years and below is the cut off age for paediatric patients in the hospital) with clinical, endoscopic, and histopathological evidence of CRC were selected.Patients with peritoneal carcinomatosis, those with ECOG/WHO stage 4 performance status and those who declined consent for surgery were excluded.

Informed consent was obtained according to the Helsinki guidelines and Ethical clearance was given by the hospital management. All data obtained was assessed using the Statistical Package for Social Sciences, version 20.0 (IBM, Armonk, NY, USA). Continuous variables were presented as mean ± SD. Categorical variables were expressed as frequencies and percentages. The Pearson's chi square test was used to determine the relationship between two categorical variables. $P<0.05$ was considered statistically significant.

Results

A total of 65 patients were studied. 67.7% were males and 32.3% were females, with a male-female ratio of 2:1. The mean age was 50.5, with an age range of 16-79 years. The peak age of occurrence of CRC is 36-65 years (Table 1).

The most common of Colorectal cancers in North-eastern Nigeria are: Rectal cancer (33.8%), Anorectal cancers (21.5%) and Sigmoid colonic cancers at 15.4%. Right sided colonic tumours constituted 15.4% with predominance of caecal pole tumours (10.8%). The least common phenotypes were Transverse colonic (3.1%), ascending colonic, descending colonic and recto-sigmoid cancers, at 4.6% each (Table 2).

Only 49.2% of the patients presented early.About 41.5% presented with locally advanced disease, majority with malignant bowel obstruction. About 9.2% of the patients presented with metastatic disease. Liver metastasis, malignant ascites and malignant pleural effusion being the most common complication (Table 3).

The age and gender influenced the clinical stage at presentation. Younger patients presented with locally advanced or metastatic diseases than the elderly.66.7% of all locally advanced cancers were seen in patients within 16-55 years and 83.3% of all metastatic diseases were seen within the same age range (Table 4).

Gender also played significant role in the late presentation. Females presented with early disease more than the males, as 70.4% of patients with locally advanced disease were males and 83.3% of patients with metastatic diseases were also males (Table 5).

Adenocarcinoma is the most common histological variant (86.2%), followed by Gastro-intestinal Stromal Tumours (GIST) at 4.6%. All the remaining histological variants like, Lymphoma, Epidermoid Carcinoma, Cloacagenic Carcinoma, Small and Large cell carcinoma, occurred at almost same frequency of 1.5% (Table 6). About 41.5% are well differentiated carcinoma and a relatively significant proportion is either poorly differentiated (16.9%) or other biologically aggressive subtypes; Mucin secreting at 10.8% and Signet ring type at 4.6% (Table 6).

Clinical Stage	Frequency	Percent
Early	32	49.2
Locally Advanced	27	41.5
Metastatic	6	9.2
Total	65	100.0

Table 3: Showing the clinical stage at presentation

Age	Clinical_Stage			Total
	Early	Locally Advanced	Metastatic	
16-25 years	3	4	2	9
26-35 years	5	4	2	11
36-45 years	10	4	0	14
46-55 years	5	6	1	12
56-65 years	5	6	0	11
66-75 years	3	1	0	4
75 years and above	1	2	1	4
Total	32	27	6	65

$X^2 = 0.521$, P = 0.05

Table 4: Showing the relationship between age and clinical stage at presentation

		Clinical_Stage			Total
		Early	Locally Advanced	Metastatic	
Gender	Male	20	19	5	44
	Female	12	8	1	21
Total		32	27	6	65

X^2=0.562, P= 0.05

Table 5: Showing the relationship between gender and clinical stage at presentation

Histology	Frequency	Percent
Adenocarcinoma	56	86.2
Small Cell Carcinoma	1	1.5
Lymphoma	1	1.5
Epidermoid Carcinoma	2	3.1
Gastro-Intestinal Stromal Tumours	3	4.6
Carcinoid Tumour	1	1.5
CloacagenicCarcinoma	1	1.5
Total	65	100.0

Table 6: Showing the distribution of the histological types of CRC

Anorectal (37.0%) and rectal cancers (33.3%) contributed to 70% of the locally advanced disease burden and rectal (50%) and anorectal cancers (33.3%) are responsible for more than 80% of metastatic disease burden (Table 7) (Figure 1).

Histological grades also influenced the clinical stage at presentation. More than half of those that presented early have well differentiated cancers (59.4%) and 83.3% of all patients with metastatic disease have either a poorly differentiated cancers or signet ring type (Table 8).

Anterior resection with (18.5%) or without total Meso-rectal excision (10.8%) are the most common curative surgeries, constituting 29.3%. The second most common procedure is Abdomino-pelvic resection with end colostomy at 20%. Right hemicolectomy was done to 15.4% of the patients for both Caecal pole and ascending colonic

Diagnosis	Clinical_Stage			Total
	Early	Locally Advanced	Metastatic	
Caecal Pole Cancer	5	2	0	7
Ascending Colon Cancer	2	1	0	3
Transverse Colonic Cancer	1	1	0	2
Descending Colonic Cancer	3	0	0	3
Sigmoid Colonic Cancer	7	2	1	10
Rectal Cancer	10	9	3	22
Recto-Sigmoid	2	1	0	3
Anorectal Cancer	2	10	2	14
Anal	0	1	0	1
Total	32	27	6	65

$X^2 = 0.461$, P = 0.005

Table 7: Showing relationship between anatomical site of cancer and clinical stage at presentation

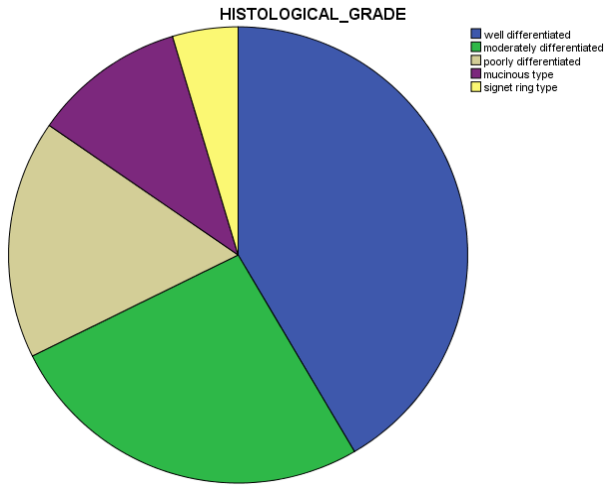

Figure 1: Showing the distribution of the histological grades

tumours (Table 9). Paul Muckliz colostomy is the most common procedure for those with locally advanced disease and malignant bowel obstruction(Table 9). Palliative drainage with or without concurrent sclerotherapy was the most common procedure for those with malignant exudative fluid collections.

The most common adjuvant care given was cytotoxic chemotherapy (93.8%) and 4.6% received Targeted therapy (Imatinib) for GIST. One patient (1.5%) did not receive any adjuvant care.

Only 20% of the patients survived for 5 years and above after treatment, but, up to 87.4% were alive 3 years after treatment and majority are the young folks(Table 10). Apart from age, clinical stage, histologic grade and the type of surgery performed also affected the outcome.

A hundred percent (100%) of those who survived for 5 years and above after treatment had no metastatic disease. Also 88% of patients that survived for 4 years had no metastatic disease. Patients with locally advanced disease complicated by malignant bowel obstruction, internal or external fistulae fared relatively well, with 3-5-year overall survival of about 90% (Table 11).

The higher the histological grade, the worse the outcome. Poorly differentiated cancers, mucinous and signet ring carcinomas are responsible for more than 50% of CRC related mortality in less than 3 years after treatment (Table 12).Patients with abysmal overall survival, especially those that died early after surgical care had a

Histological Grade	Clinical_Stage			Total
	Early	Locally Advanced	Metastatic	
Well differentiated	19	8	0	27
Moderately differentiated	7	9	1	17
Poorly differentiated	2	5	4	11
Mucinous type	3	4	0	7
Signet ring type	1	1	1	3
Total	32	27	6	65

X^2 =0,007, P = 0.005

Table 8: Showing relationship between histological grade and clinical stage at presentation

Procedure	Frequency	Percent
Right hemicolectomy	10	15.4
Transverse colectomy	2	3.1
Left hemicolectomy	3	4.6
Pelvic colectomy	8	12.3
Anterior resection and TME	12	18.5
Low anterior resection	7	10.8
Abdomino-pelvic resection	13	20.0
Hartman's procedure	3	4.6
Paul Muckliz colostomy	7	10.8
Total	65	100.0

Table 9: Showing distribution of surgeries performed

poorly differentiated cancers or a biologically aggressive subtype. We can see from Table 12 that out of the 11 patients with poorly differentiated cancers, 7 (63.6%) died within 3 years of surgery and 100% of all patients with signet ring type died within 3 years of surgery.

The more extensive the surgery is, the poorer the overall survival. About 77% of all patients that survived for 5 years and above after surgery had right hemicolectomy, left hemicolectomy or pelvic colectomy (Table 13). About 65% of patients that survived for 3 years or less after treatment had an anterior resection or an Abdomino-perineal resection with terminal colostomy (Table 13).

The socio-economic status of the patients affected their life time risk of developing CRC. Majority of the patients diagnosed with CRC are in the middle class. About 26.15% each are either Business people or Civil Servants (Table 14). The business people and the civil servants made up to 52.3% of the patients diagnosed with CRC.

The social class also influence the risk of exposure to environmental factors that increase the risk for developing CRC, such as smoking and alcohol consumption (Tables 15,16). About 59% of those that smoke and 50% of those that consume alcoholic beverages are either civil servants or business men.

Some of patients had past history of surgical procedures with known risk for CRC. A total of 9.3% had previous surgical procedure (Table 17). All the patients with previous cholecystectomy (6.2%) and massive Ileal resection (3.1%) developed Rectal carcinoma (Table 18).

Discussion

Although CRC is a global public health problem, there is an obvious disproportionate higher prevalence in the more affluent nations of the world. The American Cancer Society estimated that,in 2017, about 95,520 new cases of colon cancer and 39,910 cases of rectal cancer will be diagnosed in the US[23].This is by far higher than the reported prevalence in Sub-Saharan Africa, where the crude incidence is estimated at about 4.04/100,000 population (4.38 men and 3.69 women)[3].They reported that, even if the incidence of Colonic cancers is similar in men (47,700) and women (47,820) in the US, a higher number of men (23,720) than women (16,190) will be diagnosed with rectal cancer.[23]This is similar to our finding, as men outnumbered the females, with a male to female ratio of 2:1 and a predominance of Rectal and Recto-Anal cancers in our patients (Table 2). The male: female ratios varied in different parts of Nigeria. Earlier reports from Ibadan, South-West of Nigeria indicated 1:1 ratio[24-26].Iliyasu in Ibadan however reported a ratio of 1.3:1,[27] and other reports from the South-west indicated a ratio of1.5:1. [28,29]Reports from Jos, North-Central of Nigeria was also at 1.5:1. [30].The Eastern part of Nigeria were however similar to ours at a ratio of 2:1. [31].The North-western part of Nigeria, which is demographically and culturally closer to the North-east has a male-female ratio of 2.5:1. [32].No plausible explanation has been given for the increased male preponderance. Both males and females live in the same environment and consume similar food types. The males in Northern Nigeria however, consume roasted red meat at a quantity by far larger than the females. This may increase the carcinogenic faecal acid load. Smoked meat is known to contain high deposits of harmful chemicals, such as Polycyclic Aromatic Hydrocarbons, and other substances considered to be carcinogenic[33].

The mean age of our patients was 50.5 (+_ 3.5), with an age range of 16-79 years. The peak age of occurrence of CRC in our patients is 36-65 years (Table 1).This indicated the occurrence of CRC in the younger age compared to the Caucasians. CRC is seen in patients older than 50 years in patients from the affluent western nations, [34] in contrast to African countries where the disease though rare is seen in patients younger than 50 years increasingly. Reports from other parts of Africa and within Nigeria showed similar trend.Most of the studies show an average age of between 43 and 46 years,[24, 26,27,29,31,32]except for the report from Ife which showed an average age of 53 years[35].These support the observation that CRC occurs a decade or two earlier in Africans than in Caucasians[4,5]. The more alarming is the proportion of patients below the age of 30 years and these constituted between 23% and 48% of all patients seen with colorectal cancer within a given institution[36].

These data are however, tertiary hospital based and only few have a functional cancer registry. Many of the patients are treated at secondary tier health facilities.

It was noted in this study that CRC is more common in the young (Table 1) and the young people in the study population are the most gainfully employed. They are either Entrepreneurs or government workers (Table 14). The relationship between higher socio-economic level and CRC is statistically significant in our study (Table 14). The relationship between CRC and social class in the African population is well studied. This relationship is explained in terms of nutritional and cultural transition that follows social class mobility. The middle class in Nigeria adopt modern lifestyles during economic and social development. They also easily become influenced by urbanization and acculturation. The most prominent changes noticed are changes in dietary patterns during the nutrition transition. It involves decreases in staple foods rich in starch and dietary fibre, increases in foods from animal origin rich in total fat and saturated fatty acids, decreases in plant protein sources such as legumes, and increases in energy-dense snack foods, carbonated sweetened beverages, commercially available alcoholic beverages, as well as added sugar, fats and oils in preparation of food. This nutrition transitionis often accompanied by decreased physical activity, overweight and obesity. The mean BMI in the African continent has been steadily increasing even in low and middle-income countries, including those in West Africa. Urbanization has led to the emergence of soft drinks and fast foods and many Western brand names on the continent. In many urban areas, such Western food items are regarded as desirable status symbols, rapidly inculcated by local inhabitants, and widely consumed.The predominant meal is Maize, with associated fat laden soup and roasted meat for the affluent in the North-eastern Nigeria. The Fungus, Fusarium Monoliforme produces the carcinogenic fungal

Age	Survival_Year						Total
	5 years and above	4 years	3 years	2 years	1 year	Less than a year	
16-25 years	1	3	3	0	2	0	9
26-35 years	2	1	5	1	1	1	11
36-45 years	4	7	2	1	0	0	14
46-55 years	1	7	2	1	0	1	12
56-65 years	3	4	4	0	0	0	11
66-75 years	2	2	0	0	0	0	4
75 years and above	0	1	1	0	2	0	4
Total	13	25	17	3	5	2	65

X^2= 0.260, P = 0.005

Table 10: Showing relationship between age and overall survival

Advanced Disease	Survival_Year						Total
	5 years and above	4 years	3 years	2 years	1 year	Less than a year	
Malignant pleural effusion	0	0	0	0	1	0	1
None	13	22	15	2	0	0	52
Pathological fracture	0	0	0	0	0	1	1
Malignant ascites	0	0	0	0	1	0	1
Malignant bowel obstruction	0	3	2	1	1	1	8
Internal fistula	0	0	0	0	2	0	2
Total	13	25	17	3	5	2	65

X^2= 0.000, P = 0.00

Table 11: Showing relationship between clinical stage and overall survival

Overall Survival	Histological_Grade					Total
	Well Differentiated	Moderately Differentiated	Poorly Differentiated	Mucinous Type	Signet Ring Type	
5 years and above	10	1	0	2	0	13
4 years	13	10	0	2	0	25
3 years	3	5	4	3	2	17
2 years	0	0	3	0	0	3
1 year	1	0	3	0	1	5
less than a year	0	1	1	0	0	2
Total	27	17	11	7	3	65

X^2= 0.000, P = 0.005

Table 12: Showing relationship between histological grade of cancers and overall survival

Surgery	Survival_Year						Total
	5 years and above	4 years	3 years	2 years	1 year	Less than a year	
Right hemicolectomy	5	3	2	0	0	0	10
Transverse colectomy	0	1	1	0	0	0	2
Left hemicolectomy	1	2	0	0	0	0	3
Pelvic colectomy	4	3	1	0	0	0	8
Anterior resection and TME	2	9	1	0	0	0	12
Low anterior resection	1	3	2	1	0	0	7
Abdomino-pelvic resection	0	4	7	2	0	0	13
Hartman's procedure	0	0	3	0	0	0	3
Paul Muckliz colostomy	0	0	0	0	5	2	7
Total	13	25	17	3	5	2	65

X^2 = 0.000, P = 0.005

Table 13: Showing relationship between surgery and overall survival

	Occupation					Total
	Farmer	Fisherman	Business	Civil Servant	Unemployed	
16-25 years	0	0	0	3	6	9
26-35 years	0	1	2	7	1	11
36-45 years	2	2	6	3	1	14
46-55 years	1	1	6	3	1	12
56-65 years	3	5	2	1	0	11
66-75 years	1	2	1	0	0	4
75 years and above	3	1	0	0	0	4
Total	10	12	17	17	9	65

Table 14: Showing relationship between social class and risk for CRC (X^2 = 0.000, P= 0.005)

Occupation	Smoking		Total
	Yes	No	
Farmer	1	9	10
Fisherman	2	10	12
Business	4	13	17
Civil Servant	6	11	17
Unemployed	4	5	9
Total	17	48	65

Table 15: Relationship between social class and smoking (X^2 = 0.371, P = 0.005)

Occupation	Alcohol		Total
	Yes	No	
Farmer	1	9	10
Fisherman	1	11	12
Business	3	14	17
Civil Servant	2	15	17
Unemployed	3	6	9
Total	10	55	65

Table 16: Relationship between social class and alcohol intake (X^2 = 0.634, P = 0.005)

Surgery	Frequency	Percent
None	59	90.8
Cholecystectomy	4	6.2
IlealResection	2	3.1
Total	65	100.0

Table 17: Showing distribution of premorbid surgeries

Diagnosis	Previous_Surgery			Total
	None	Cholecystectomy	Ileal resection	
Caecal Pole Cancer	7	0	0	7
Ascending Colon Cancer	3	0	0	3
Transverse Colonic Cancer	2	0	0	2
Descending Colonic Cancer	3	0	0	3
Sigmoid Colonic Cancer	10	0	0	10
Rectal Cancer	16	4	2	22
Recto-Sigmoid	3	0	0	3
Anorectal Cancer	14	0	0	14
Anal	1	0	0	1
Total	59	4	2	65

Table 18: Showing relationship between past surgery and CRC (X^2 = 0.679, P = 0.005)

toxin: Fuminosins B1. This toxin has been isolated in high quantity from mouldy Maize in the Transkei area of South Africa. The level of the Fuminosins B1 toxin in the Maize correlated with the incidence of gastro-intestinalcancers in the Transkei. About 59% and 50% of the patients diagnosed with CRC either smoke cigarette or consume alcoholic beverages (Table 15,16). Although majority of these cohorts of patients was also below 50 years of age the relationship is not statistically significant (Table 17,18). Other workers though opined that the burden of all forms of cancer is on the rise in Africa due to improvement in the average life expectancy. The improved longevity is said to bring an increased prevalence of risk factors associated with economic transition which include smoking, obesity, and physicalinactivity. The middle class African populations has demonstrable changes in diet toward high saturated fat intake. Nigerians consume the most alcohol in West Africa, and Sierra Leone and the Gambia are the top cigarette smoking nations in West Africa.

The only premorbid medical conditions found in our patients are Diabetes Mellitus and Hypertension. We couldn't find any association between CRC and antihypertensive or oral hypoglycaemic agents. However, 9.3% of our patients had premorbid surgical procedures with documented risk for CRC. 6.2% had Cholecystectomy and 3.1% had massive Ileal resection. Cholecystectomy has been implicated in the causation of CRC due to loss of Bile storage function of gallbladder. There is increased concentration and time of contact of carcinogenic faecal bile acid and the colorectal mucosa.[57]In the same vein, massive Ileal resection also interrupts entero-hepatic circulation of bile and the subsequent increased exposure of the colorectal mucosa to carcinogenic secondary bile acids.

The most common of colorectal cancers in North-eastern Nigeria are: Rectal cancer at 33.8%, Anorectal cancers at 21.5% and Sigmoid colonic cancers at 15.4%. Right sided colonic tumours constituted 15.4% with predominance of caecal pole tumours at 10.8%. The least common phenotypes were Transverse colonic at 3.1%, ascending colonic, descending colonic and recto-sigmoid cancers, at 4.6% each (Table 2).Similar observation was made by Aliyu et. Al in Maiduguri, North-eastern Nigeria[37].He reported carcinoma of the rectum as the commonest at51.49%, followed by anal cancer at 21.78%, with tumour synchrony occurring in 3.66%. Many reports indicated that West African patients usually have a higher percentage of rectal than colon cancer[8-10],except for a single report from Mali that showed 56% colon to 44% rectum proportion[38].This topographical variance in African patients has elicited continuous discussion, with no tenable reason proffered except for the possibility of separate aetiopathogenesis for Rectal cancer, different from that of Colonic cancers[39,40]. Early diseases are not often seen in Africa. Only 49.2% of our patients presented early.About 41.5% presented with locally advanced disease, majority with malignant bowel obstruction. About 9.2% of the patients presented with metastatic disease. liver metastasis, malignant ascites and malignant pleural effusion being the most common complication (Table 3)Aliyu et.al made similar observation in Maiduguri, Nigeria[38].Presentation with advanced disease was the norm in many reports. An unacceptable figure of 53.7–81.5% of the patients presented in Duke's stage D[29,30]. The cause of the late presentation may be related to presence of myriad of colorectal lesions that present with per rectal bleeding and weight loss in the African patient and symptoms are likely to be given less importance. Lack of organised screening programmes for early detection and the out-of-pocket payment for medical services result in late presentation, particularly, in the poor rural patients.Age influenced the clinical stage at presentation. Younger patients presented with locally advanced or metastatic diseases than the elderly.66.7% of all locally advanced cancers were seen in patients within 16-55 years and 83.3% of all metastatic diseases were seen within the same age range (Table 4, X^2 = 0.521, P = 0.005). The relationship is however, not statistically significant. Gender also played significant role in the late presentation. Females presented with early disease more than the males, as 70.4% of patients with locally advanced disease were males and 83.3% of patients with metastatic diseases were also males (Table 5, X^2 = 0.562, P= 0.005). The relationship is also not statistically significant. The late presentation with advanced disease may be related to the preponderance of genetic mutation and hereditary cancers in the young patients. Females are known to seek for medical care earlier than the males and the predominant rectal and anorectal cancers are seen more frequently in the males[23]. Histological grades also influenced the clinical stage at presentation. More than half of those that presented early have well differentiated cancers (59.4%) and 83.3% of all patients with metastatic disease have either a poorly differentiated cancers or signet ring type (Table 8, X^2 = 0.007, P = 0.005).

Adenocarcinoma is the most common histological variant at 86.2%, followed by Gastro-intestinal Stromal Tumours (GIST) at 4.6%. All the remaining histological variants like, Lymphoma, Epidermoid Carcinoma, Cloacagenic Carcinoma, Small and Large cell carcinoma, occurred at almost same frequency of 1.5% (Table 6). About 41.5% are well differentiated carcinoma and a relatively significant proportion is either poorly differentiated (16.9%) or other biologically aggressive subtypes; Mucin secreting at 10.8% and Signet ring type at 4.6% (Figure 1).Aliyu et.al [38] made similar observation in Maiduguri, North-east, Nigeria. They reportedadenocarcinoma as the commonest in 92.68% of their patients [39-41]. Ibrahim et al. [42] in Ilorin, North-central, Nigeria also made similar observation.

Anterior resection with (18.5%) or without total Meso-rectal excision (10.8%) are the most common curative surgeries, constituting 29.3%. The second most common procedure is Abdomino-pelvic resection with end colostomy at 20%. Right hemicolectomy was done to 15.4% of the patients for both Caecal pole and ascending colonic tumours (Table 9). Paul Muckliz colostomy is the most common procedure for those with locally advanced disease and Malignant bowel obstruction (Table 9). Palliative drainage with or without concurrent sclerotherapy was the most common procedure for those with malignant exudative fluid collections.Curative tumour resection with primary end-end anastomosis at same sitting after on table bowel lavage has been reported for patients that presented with malignant bowel obstruction[41].Some authors reported doing preliminary colostomies[29]. Advanced CRC with pelvic sidewall infiltration was managed by fashioning a divided stoma (Devine colostomy)and intra-stoma 5-Fluorouracil injection was administered, which was said to have ameliorated the troubling symptom of tenesmus[42].

The most common adjuvant care given was cytotoxic chemotherapy (93.8%) and 4.6% received Targeted therapy (Imatinib) for GIST. One patient (1.5%) did not receive any adjuvant care. The lack of Radiotherapy facility and other treatment modalities limited our treatment options. The lack of radiotherapy facility is well known in Africa and the West African region is the worst hit, with only 4 out of 16 countries offering radiation therapy[12].

The overall survival rate is poor in Africa as only 20% of the patients survived for 5 years and above after treatment, but, up to 87.4% were alive 3 years after treatment and majority are the young folks (Table 10, X^2 = 0.260, P = 0.005). The relationship is not statistically significant though. Apart from age, clinical stage, histologic grade and the type of surgery performed also affected the outcomeA hundred percent of those who survived for 5 years and above after treatment had no metastatic disease. Also 88% of patients that survived for 4 years had no metastatic disease. Patients with locally advanced disease complicated by malignant bowel obstruction, internal or external fistulae fared relatively well, with 3-5-year overall survival of about 90% (Table 11, X^2 = 0.000, P = 0.005). This relationship is statistically significant.

The higher the histological grade, the worse the outcome. Poorly differentiated cancers, mucinous and signet ring carcinomas are responsible for more than 50% of CRC related mortality in less than 3 years after treatment (Table 12, X^2 = 0.000, P = 0.005). This is also statistically significant. We can see from table 12 that out of the 11 patients with poorly differentiated cancers, 7 (63.6%) died within 3 years of surgery and 100% of all patients with signet ring type died within 3 years of surgery. This observation was also made by other workers in Africa. It has been reported that in west Africa, patients present with advanced CRC because most of colorectal cancers have an unfavourable and/or aggressive tumour biology by the presence of increased mucinous and signet-ring types and majority of these patients are below 40 years of age[8,9].Mucinous cancers of the colon and rectum are said to occur generally in 10–15% of cases; they have a bad prognosis and are common in younger patients[43-47].The signet ring type is said to have an even poorer prognosis than themucinous type.These histopathological types along with anaplastic types have been reported to occur in up to 40–50% of patients under 30 years in Nigeria[48]. Higher incidences of mucinous and anaplastic tumours are also seen in Africans than in the Caucasians[49].

The more extensive the surgery is, the poorer the overall survival. About 77% of all patients that survived for 5 years and above after surgery had right hemicolectomy, left hemicolectomy or pelvic colectomy (Table 13). About 65% of patients that survived for 3 years or less after treatment had an Anterior resection or an Abdomino-perineal resection with terminal colostomy (Table 13, X^2 = 0.000, P = 0.005). This is also statistically significant.This abysmal picture is similar to report from South-west, Nigeria. Oribabor et.al [45] reported 21.2% post-operative mortality [43]. In contrast, reports from Europe and Japan indicated mortality rate of 0.5-4.2% from series on CRC and overall five-year survival also exceeds 50% [50-59].

Conclusion

The incidence of CRC is on the rise in the African continent, perhaps, due to the nutritional transition from the traditional fibre based diet to the low residue, high calorie and fat rich western diet. CRC affects the African population at an earlier age than the Caucasians and biologically aggressive variants are prevalent. Late presentation with advanced stage and presence of higher histological grade contribute to the low overall survival in our patients.

Recommendation: The provision of screening facility is pertinent in the African continent to achieve early detection. The dearth of adjuvant multi-modal therapy is unacceptable and should be the focus of most African countries.

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