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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 are 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 is 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 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, 14, 15], The CRC in the young is said to be also biologically aggressive and may contribute to the late presentation [16, 17].

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. 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).

Table 1: showing the age distribution of the patients

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

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).

Table 2: showing the anatomical site distribution of CRC

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

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)

Table 3: showing the clinical stage at presentation

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

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).

Table 4: showing the relationship between age and 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

$X^2 = 0.521$, $P = 0.05$

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).

Table 5: showing the relationship between gender 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

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 are either poorly differentiated (16.9%) or other biologically aggressive subtypes; Mucin secreting at 10.8% and Signet ring type at 4.6% (Figure 1).

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

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
Cloacagenic carcinoma	1	1.5
Total	65	100.0

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).

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

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

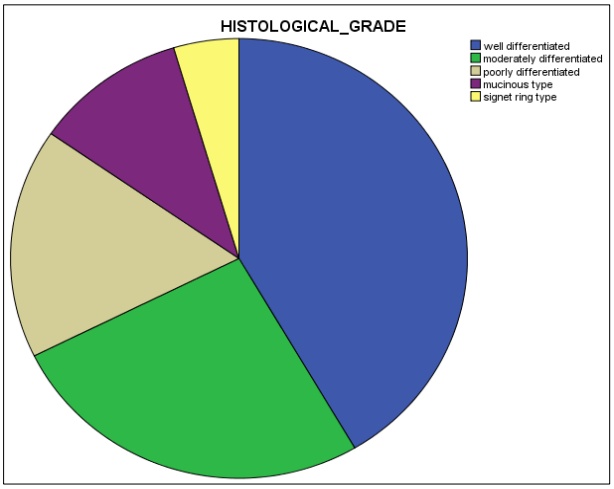

Fig 1: showing the distribution of the histological grades.

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).

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

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

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.

Table 9: showing distribution of surgeries performed

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

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.

Table 10: showing relationship between age and overall survival

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

$X^2 = 0.260$, $P = 0.005$

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).

Table 11: showing relationship between clinical stage 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

$X^2 = 0.000$, $P = 0.00$

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).

Table 12: showing relationship between histological grade of cancers 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

$X^2 = 0.000$, $P = 0.005$

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).

Table 13: showing relationship between surgery 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

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, 25, 26]. Iliyasu in Ibadan however reported a ratio of 1.3:1 [27], and other reports from the South-west indicated a ratio of 1.5:1 [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 [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.

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 at 51.49%, 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, 9, 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 is 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 [37]. 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 are 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 made similar observation in Maiduguri, North-east, Nigeria. They reported adenocarcinoma as the commonest in 92.68% of their patients [37]. Ibrahim *et al* in Ilorin, North-central, Nigeria also made similar observation [41].

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 outcome A 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. 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 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% [44, 45].

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.

Conflict of Interest: None

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