Original Research Article

Distribution Patterns of Morphologies of Colorectal Carcinoma: A Descriptive, Cross-Sectional Study

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Abstract: ***Background***: Colorectal malignancies are one of the commonest cancers throughout the world which is often diagnosed at advanced stages. Several lifestyle factors contribute to the development of this cancer such as a high intake of processed meats and low intake of fruits and vegetables, sedentary lifestyle, obesity, smoking and excessive alcohol consumption. ***Methods***: This cross-sectional study was conducted in BIRDEM General Hospital in Dhaka in the Department of Pathology with 109 resected colectomy specimens during the period of March 2020 to February 2022. Relevant findings were recorded and analyzed for determining the morphological characteristics based on histopathological types, grading and staging of the malignancy. ***Results***: Maximum patients belonged to 51-60 years of age; were males, hailing from urban regions and found to indulge in smoking. Per rectal bleeding, alteration of bowel habits and abdominal pain were the most frequently reported clinical symptoms. The commonest areas of occurrence of the tumors were rectum, recto-sigmoid junction and caecum. Out of all the 109 cases, 48, 45 and 16 belonged to non-mucinous, mucinous and signet-ring types as per histological classification respectively. Among these, 39 of non-mucinous and 24 of mucinous types belonged to Dukes' B staging whereas 11 of the signet-ring variants fell in Dukes' C stage. Regarding grading, maximum patients, meaning 68 out of 109, belonged to Grade II. After performing Fisher's exact test, associations between staging and grading, grading and types and types and grading were found statistically significant. ***Conclusion***: Colon and rectal mucin-secreting and signet-ring cell adenocarcinomas are high grade cancers that usually show up at an advanced stage.
Keywords: Colorectal cancer, malignancy, tumor, Dhaka, oncology.

INTRODUCTION

Colorectal cancer (CRC) ranks among the third most common cancer throughout the world. It is also the second most common cause of cancer-related deaths [1]. Previously, most of the cases were found in the Western countries, but as of recent times, the incidence and mortality rates have been on the rise in Asian countries as well. As per 2022 year's GLOBOCAN reports, 5,31,841 new cases were found and 2,48,902 patients of CRC have died in the Asian region [2, 3]. The rising figures in this setting can be linked to westernized dietary customs, escalation of population aging, smoking habits, sedentary lifestyles and some other risk factors. Studies revealed that, being diagnosed at younger ages led to worse fate. This finding could be linked to the facts that,

the more aggressive histopathological grades of tumors as well as low suspicion of malignancy in younger age groups leading to delay in diagnosis [4]. Clinical features of the ailment include abdominal pain, alteration of bowel habits, involuntary weight loss, loss of appetite, vomiting, frequency with colic, bleeding per rectum and so on [5].

With the inclusion of effective screening programs over the last few years, the incidence and mortality rates seem to take the edge off as early detection and treatment is the major prevention strategy. Management modalities depend on staging of the disease, the performance status of the patients, the molecular settings of the tumor and so on [6]. The

treatment options range from classic approaches such as chemotherapy, radiotherapy and surgery to newer methods like immunotherapy or combination modules [7].

Various studies have suggested that, the morphological patterns of CRC as per grading, staging and histological types are vital for determining the treatment strategies and prognosis of the disease [8, 9]. As a matter of fact, documentation and evidence about the patterns of CRC is very essential. This study aims to determine the distribution of demographic and morphologic patterns of the malignancy in a tertiary level hospital in Dhaka, Bangladesh. This is very vital for the clinicians and policy makers to establish the management modalities of the patients.

MATERIALS AND METHODS

This descriptive, cross-sectional study was performed in the Department of Pathology, BIRDEM General Hospital; one of the major tertiary level hospitals in Dhaka. The study took place during March 2020 to February 2022. A total of 109 cases of resected colorectal cancer specimens were included in the study which came across during the study period by means of purposive sampling method. The socio-demographic data, clinical information and morphological findings were recorded by means of face-to-face interview by the means of a structured questionnaire and medical records. The inclusion criteria only consisted of those patients who gave written informed consent for this study. The slides of the cases were stained using Haematoxylin & Eosin. The data, after being collected and organized, were input in Statistical Package of Social Sciences (SPSS, Version 25) for statistical analysis. The data were presented in the forms of frequency, percentages, mean and standard deviation using relevant tables. Fisher's Exact test was applied to observe associations between the qualitative variables. A p-value of <0.05 was considered as statistically significant.

Dukes' staging: In 1932, British pathologist Cuthberk Dukes devised a classification system for CRC. This staging is the most widely used means for determining the staging of colorectal cancers.

It is as follows:
   Dukes A: Invasion into but not through the bowel wall.
   Dukes B: Invasion through the bowel wall penetrating the muscle layer but not involving the lymph nodes.
   Dukes C: Involvement of lymph nodes.
   Dukes D: Widespread metastases [10].

RESULTS

Table 1: Distribution of patients according to socio-demographic characteristics of patients (n=109)

Characteristics	Frequency (f)	Percentage (%)
Age (in years)		
31-40	15	13.76
41-50	25	22.94
51-60	34	31.94
61-70	26	23.85
71-80	9	8.26
Mean age (± SD)	57.3 ± (1.14)	
Gender		
Male	64	58.72
Female	45	41.28
Area of residence		
Urban	84	77.06
Rural	25	22.93
Substance addiction history		
Smoking	48	44.03
Betel nut	39	35.77
Alcohol	16	14.68
Others	6	5.50

*SD: Standard Deviation

Table 1 above illustrates the socio-demographic characteristics of the respondents. Mean age of the respondents was 57.3 ± (1.14) years. The maximum patients were found in the age group of 51-60 years (31.94%) followed by 61-70 years (23.85%) and 41-50 years (22.94%) respectively. As per gender, 58.72% were found to be males. Majority of patients, which is 77.06% resided from urban zones. Lastly, regarding substance addiction, 44.03% were found to be smokers, followed by 35.77% patients who consumed betel nut.

Table 2: Distribution of the respondents according to clinical characteristics based on the disease (n=109)

Variables	Frequency (f)	Percentage (%)
Presenting symptoms*		
Rectal bleeding	42	38.53
Altered bowel habits	38	34.86
Abdominal pain	20	18.34
Anorexia	18	16.51
Weight loss	17	15.60
Blood & mucus in stools	12	11.0
Abdominal mass	10	9.17
Site of occurrence		
Rectum	39	35.78
Recto-sigmoid junction	28	25.68
Caecum	16	14.68
Transverse colon	9	8.25
Descending colon	7	6.42
Ascending colon	4	3.67
Splenic flexure	4	3.67
Hepatic flexure	2	1.84
Size of tumor		
≥5 cm	74	67.89
<5 cm	35	32.11

*Some patients had more than one presenting symptom.

Table 2 above shows us the distribution of the respondents based on the clinical characteristics of the disease. It is evident that, rectal bleed (38.53%) and altered bowel habits (34.86%) were the most common symptoms. In terms of location, most of the colorectal tumors frequently occurred in rectum (35.78%) followed by recto-sigmoid junction (25.68%). Lastly, maximum tumors (67.89%) were found to be greater than 5 cm in size.

Table 3: Distribution of respondents by association between Dukes' staging and histological type of colorectal carcinoma (n=109)

Histological type	Dukes' A (f/%)	Dukes' B (f/%)	Dukes' C (f/%)
Non-mucinous	5 (4.59)	39 (35.78)	4 (3.70)
Mucinous	2 (1.83)	24 (22.01)	19 (17.43)
Signet ring	3 (2.75)	2 (1.83)	11 (10.10)
Total	10 (9.17)	65 (59.62)	34 (42.26)

*Fisher's Exact Test =45.84. p value< 0.000

Table 3 above demonstrates the association between Dukes' staging and histological type of CRC. It was clearly evident that, 39 and 24 patients belonged to non-mucinous type and mucinous type respectively and fell under Dukes' B staging, whereas majority (10.10) signet ring type tumors belonged to Dukes' C staging. On performing statistical analysis, p value was found highly significant (< 0.000).

Table 4: Distribution of respondents according to association of Dukes' staging with grading of colorectal carcinoma (n=109)

Grading	Dukes' A (f/%)	Dukes' B (f/%)	Dukes' C (f/%)
Grade I	6 (5.50)	13 (11.93)	0 (0.00)
Grade II	0 (0.00)	58 (53.20)	10 (9.17)
Grade III	0 (0.00)	2 (1.83)	20 (18.35)
Total	6 (5.50)	73 (66.96)	30 (27.52)

* Fisher's Exact Test= 56.874. p value< 0.000.

Table 4 above illustrates the association between Dukes' staging with grading of CRC. It was found that, 53.20% of Grade II colorectal tumors fell into Dukes' B staging whereas 18.35% of Grade III tumors were in Dukes' C staging. Significant association was observed between histological grade and Dukes' stage of CRC (p value < 0.000).

Table 5: Distribution of respondents according to association of grading with histological types of colorectal carcinoma (n=109)

Histological type	Grade I (f/%)	Grade II (f/%)	Grade III (f/%)
Non-mucinous	17 (15.60)	41 (37.61)	5 (4.59)
Mucinous	5 (4.59)	24 (22.01)	6 (5.50)
Signet ring	0 (0.00)	0 (0.00)	11 (10.10)
Total	22 (20.19)	65 (59.62)	22 (20.19)

Fisher's Exact Test= 42.427. p-value<0.000.

Table 5 above showed the relationship between grading and histological types of colorectal cancer among the respondents. Both non-mucinous (37.61%) and mucinous types (22.01%) majorly belonged to Grade II whereas the signet ring type (10.10%) totally was in the Grade III category. Statistically significant association was observed between grading and histological types of CRC (p value <0.000).

DISCUSSION

A sum of 109 patients of colorectal carcinoma were included in this study. Along with relevant demographic and clinical findings, grading, staging and histological types were determined. Since different tumor forms differ in terms of radiosensitivity, local behavior and tendency for regional and systemic effects, identifying the kind of tumor is very essential. One major predictor of the possibility of local invasion or systemic metastases is the histological grade of the tumors. To ascertain the extent of the tumor, both locally and systemically, tumor staging based on clinical assessment, imaging investigations and histological evaluation is required [11].

The study revealed that, mean age of the respondents was 57.3 ($\pm$ 1.14) years. Majority of the respondents were males (58.72%) and resided in urban sectors (77.06%) We found that, 44.03% were smokers and 14.68% consumed alcohol. A previous study found the mean age of the patients to be 45.64 ($\pm$ 1.75) years, 70% were males, 75% belonged to urban areas and 33.57% were smokers with only 2.85% were found who drank alcohol [12]. Certain variations owe to the lifestyle and socio-cultural patterns which vary across regions.

It was seen that, bleeding per rectum (38.53%) and altered bowel habits (34.86%) were the most common findings which the patients presented with. A study performed in 2016 found that, maximum patients presented with rectal bleeding (40%) followed by bowel habit alteration (14%) [5]. In addition, the sites where CRC was frequently located were rectum (35.78%) and recto-sigmoid junction (25.68%). Another study reported similar findings [9].

With regards to Dukes' staging and histological types, non-mucinous type was mostly seen in Dukes' B stage (35.78%) whereas mucinous type was found predominantly in both Dukes' B (22.01%) and C (17.43%) stages; lastly signet ring type was few in number and seen majorly in Dukes' C stage (10.10%).

Statistical association was found to be quite significant (p<0.000). Meanwhile, concerning the grading (or differentiation) and staging, combination of grade II and Dukes' stage was most significantly seen which is 53.20% followed by grade III and Dukes' C staging that it 18.35%; in this context, the statistical association between grading (or differentiation) and staging was highly significant (p<0.000). Lastly, regarding the histological types and classification of grades, non-mucinous as well as mucinous types were most frequent in grade II (37.61% and 22.01% respectively); whereas signet ring type which is rare was only seen in grade III that is 10.10%. In this case, statistically significant association was found as well. A previous study conducted in Pakistan with 100 colectomy/hemi-colectomy specimens reported similar findings, meaning that mucin-secreting and signet-ring cell adenocarcinomas of colorectal region are high grade tumours and present at an advanced stage [8].

CONCLUSION

With contrast to mucin-secreting cancers or signet-ring cell cancers, non-mucinous cancers are often highly differentiated and develop at early stages. Colon and rectal adenocarcinomas are poorly differentiated and identified at an advanced stage.

Disclaimer (Artificial Intelligence)

Author(s) hereby declare that NO generative AI technologies have been used during writing or editing of manuscripts.

Conflict of Interest: Author(s) have declared that there are no competing interests.

RECOMMENDATIONS

1. Clinicians should give more emphasis on rectal examination by sigmoidoscopy or colonoscopy in all patients including younger patients presenting with rectal symptoms.
2. Detailed epidemiological and molecular studies need to be done to identify the etiology of young age rectal cancer in Bangladesh.

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