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Pattern of primary gastrointestinal tract cancer in a tertiary central hospital in Sudan: A prospective study

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Abstract

Background: Gastrointestinal malignancies have diverse patterns of distribution worldwide. In Africa, the gastrointestinal tract ranks as one of the common sites affected by cancer and few reports addressed this important issue. Objective: To determine the age, sex and relative frequencies of various gastrointestinal malignancies admitted from January 2011 till December 2013 in Ibn Sina hospital in Sudan. Methods: A cross-sectional descriptive study was conducted at Ibn Sina hospital. All patients diagnosed with primary gastrointestinal cancers were included in the study. Results: Out of a total of 604 cases with primary gastrointestinal malignancies 371 (61.4%) were males, while the rest were females (38.6%). The mean age of the population was 58 years. Pancreatic cancer was the most common malignancy accounting for 30.7% of cases in males and 36% in females. Malignancies of liver, stomach and esophagus followed in decreasing frequencies. About 80% of the patients were above 40 years of age and the peak of onset for most of the tumors was above 60 years of age. Conclusion: This study highlights that pancreatic cancer is the most common gastrointestinal malignancy seen followed by hepatocellular carcinoma.

Keywords

Gastrointestinal Malignancies, Pancreatic Cancer, Colorectal Carcinoma, Hepatocellular Carcinoma

1. Introduction

The gastrointestinal (GI) tract along with its accessory glands is one of the most common systems of the human body affected by various cancers. The pattern of primary GI cancer differs in different regions of the world depending upon the genetic, cultural, dietary and socioeconomic factors (1). Therefore, studying the pattern of GI cancer in a certain region of the world will help health planners to find the population groups which are at a high risk of developing cancer and recommend preventive measures or advise appropriate screening in high risk populations.

In summary, the incidence rates of GI cancers vary widely by geography. This is due in part to genetic differences, including racial and ethnic differences. It is due also in part to differences in environmental and dietary exposures, factors that can potentially be altered. Therefore, establishment of regional and international databases is critical to improving our understanding of the etiology of cancer, and will ultimately assist in the initiation of targeted strategies for global cancer prevention. Furthermore, the monitoring of cancer mortality rates and 5-year, cancer-specific survival rates will identify regions where there are inequities of health care, so that access to health care can be facilitated and guidelines for treatment can be established. The aim of the present study is to collect the data of all patients with various GI malignancies admitted to Ibn Sina hospital from January 2011 till December 2013 and determine the relative frequency, age and sex of these malignancies. Our current report is the first to describe this pattern in the Sudan.

2. Methods

A cross-sectional descriptive study was conducted from January 2011 to December 2013 on all the cases of GI malignancies referred to Ibn Sina hospital, Khartoum, Sudan. They were referred from all parts of Sudan for evaluation and/or treatment. The tumors of the oral cavity were excluded from the study. All the cases were histologically confirmed.

The collected data were computerized and statistically analyzed using SPSS (Statistical Package for Social Science) version 19. Descriptive statistics were used to quantify the categorical variables. Chi square was calculated to compare between gender role in specialties and factors affecting specialty choices. P value (< 0.05) was considered significant difference. The ethical approval for this study was obtained from the ethical committee at Ibn Sina hospital. An informed consent was obtained from patients.

3. Results

A total of 604 cases with primary GI tumors were retrieved during the study period from January 2011 till December 2013. Out of these, 371 cases were males while the rest were females. Table 1 shows the general characteristics and demographic variables of patients with primary GI malignancies. Pancreatic cancer was the most common malignancy in both males and females accounting for 30.7% and 20.2% of cases in the respective populations. Liver, stomach and esophagus followed in decreasing frequencies. The mean age of the population studied was 58+16 years (SD). Table 2 shows the sex distribution of various GI malignancies and highlights the number of patients involved in each sex in different tumors with a male to female (M: F) ratio of 1.6:1. The M: F ratio varied from 2:1 to 2.4:1 in liver, pancreas and appendicular malignancies. The ratio was about 1.5:1 in esophageal, gastric and colorectal malignancies, whereas the ratio is reversed in gall bladder, biliary tract and anal tumors. Table 3 shows further analysis of age distribution of various GI malignancies. More than 90% of the patients belonged to age group of > 40 years of age with most of tumors showing a peak of onset between 60 and 70 years of age. Anal canal and appendicular cancers occurred in a relatively younger age group between 30 and 60 years of age.

Table 1. *The general characteristics and other related variables of study participants (n=604)*

Characteristics	No of Patients (%)	
Gender	Female	233 (38.6)
	Male	371 (61.4)
Marital status	Married	592 (98)
	Single	12 (2)
Age distribution	0-20	2 (0.4)
	21-40	35 (5.7)
	41-60	205 (33.9)
	> 60	363 (60)
Residence	Urban	501 (82.9)
	Rural	103 (17.1)

Table 2. *Sex distribution of 604 cases of primary GI cancers.*

Diagnosis	Total number	No of males	No of Females	Male: Female Ratio
Pancreas	161	114	47	2.4:1
Liver	102	70	31	2.2:1
Stomach	90	55	35	1.6:1
Esophagus	87	50	37	1.4:1
Colorectal	85	51	34	1.5:1
Biliary tract	49	20	29	0.7:1
Anal canal	11	4	7	0.6:1
Gallbladder	9	2	6	0.3:1
Small intestines	7	2	1	2:1
Appendix	3	3	1	3:1
Total	604	371	233	1.6:1

Table 3. *Age distribution of 604 cases of primary GI cancers.*

Diagnosis	0-10	11-20	21-30	31-40	41-50	51-60	61-70	>70
Pancreas	0	0	0	1	17	33	60	50
Liver	1	0	0	1	2	25	41	32
Stomach	0	0	0	10	16	33	17	14
Esophagus	0	1	4	5	13	15	35	15
Colorectal	0	0	2	6	8	19	35	15
Biliary tract	0	0	0	0	1	10	18	20
Anal canal	0	0	1	0	2	5	0	3
Gallbladder	0	0	0	0	0	3	5	1
Small intestines	0	0	0	2	2	1	2	0
Appendix	0	0	1	2	0	0	0	0
Total	1	1	8	27	61	144	213	150

The majority of esophageal cancer occurred in the lower one third of the esophagus (71 %) followed by the middle one third (20%) and the upper one third (9%). Gastric cancer was equally located in the antrum (40%) and the body of the stomach (40%) followed by the fundus (20%). The rectosigmoid segment was affected in 50 % o f cases of colorectal malignancy, cecum (22%) and the remaining colorectal tract (22%). Ninety-two cases of primary liver malignancy were hepatocellular carcinoma, eight cases where cholangiocarcinoma and two cases were hepatoblastoma.

4. Discussion

Gastrointestinal (GI) malignancies are notorious for frequently progressing to advanced stages even in the absence of serious symptoms, thus leading to delayed diagnoses and dismal prognoses. Secondary prevention of GI malignancies through early detection and treatment of cancer-precursor/premalignant lesions, therefore, is recognized as an effective cancer prevention strategy. All over the world, GI tract malignancies form a significant proportion of malignant tumors in both sexes.

Cancer incidence in general and GI cancer in particular varies widely in different parts of the world in different age groups. Distribution of cancer can also vary over time depending on various factors such as behavior and environmental changes, availability of medical facilities, changes in age distribution of population, public education and availability of screening programs (2-4).

This study is based on the figures on cases reported from January 2011 till December 213 in the central referral hospital for gastrointestinal diseases in Sudan. This is the first study which has attempted to show the distribution of various primary GI malignancies in Sudan. According to our study a total of 604 cases were reported to have different GI tumors. Out of these 371 (61.4%) were males while the 233 (38.6%) were females.

Pancreatic cancer was found to be the most common tumor in this study accounting for 26.6% of cases with a mean age of 59 years and M: F ratio of 2.4:1. This finding is in sharp contrast to the data previously published form developing countries (3, 5-7). According to studies by Bedikian, Koreich, and Ajarim it was ranked as the 3rd most common GI malignancy is Saudi Arabia (4, 6). It was reported as the 2nd and 4th most common malignancy in 2 studies from Egypt and Ethiopia (3, 8). There can be many explanations for this interesting observation. The predominance of pancreatic malignancies, in our study, is markedly due to presence of senior surgeons dealing with this specific disease which created referral bias. The other possible explanation may be the expansion of GI services and availability of imaging facilities in many hospitals in this area in recent years resulting in higher diagnostic yield of this malignancy.

Hepatocellular carcinoma is the 2nd most common tumor seen in our study presenting in 16.8% of the Sudanese population. These results are also quite different from most of the previously published hospital based studies in which this tumor ranked as the most common GI tumor (8-11). This has been thought to be due to a high endemicity of Hepatitis B Virus (HBV) infection in different regions of Africa, There is an ongoing compulsory mass immunization program in Sudan for children and high risk groups. This will hopefully ensure a reduction in the incidence of this malignancy.

About 60% of stomach cancer occurs in the developing countries. The areas of highest incidence are eastern Asia, Eastern Europe and some parts of South Africa, whereas in northern America and Europe the incidence is low. The risk of cancer changes within two generations on migration to new locale (7). Gastric cancer is the 3rd most common malignancy in our study representing 15% of total cases. In a cancer incidence report by the cancer registry of Kenya, it has been found to be the 9th most common tumor in Kenya with a frequency of 4% (12). In the same report this malignancy ranked 6th in males and 10th in females. In a few other studies it has been ranked as the most common GI tumor (2, 13, 14). This tumor has been recently shown to have a clear association with Helicobacter Pylori (H. Pylori). The fact that H. Pylori has a high prevalence in Sudan explains the high prevalence of this malignancy.

Esophageal carcinoma is the 4th most common tumor in our study with a frequency of 14.5%, which is a little less then gastric cancer. Colorectal cancer was found to be the 5th most common tumor in this study accounting for 14% of cases with a mean age of 54 years and a M: F ratio of 1:50:1. This finding is not in contrast to the data previously published form developed countries. According to studies by Bedikian, Koreich, and Ajarim it was ranked as the 3rd most common GI malignancy is Saudi Arabia. It was reported as the 2nd and 4th most common malignancy in 2 studies from Rabadi and Al-Mofarreh. In a recent cancer incidence report in Egypt from 2005 to 2011, colorectal cancer has been found to be the 5th most common malignancy among 10 common tumors and the 2nd highest GI malignancy in Egypt accounting for 5.5% of total cases reported. There can be many explanations for this interesting observation. Colorectal cancers arise through a complex interaction between genetic and environmental factors and generally evolve over a long period of time from an adenoma carcinoma sequence (11). The difference from developed countries is that most of our cases are de novo rather than following adenoma carcinoma sequence observed in most of the developed countries (10). Diet is by far the most important factor identified in the aetiology of colorectal cancer. Diet rich in calories, animal fat and red meat and poor in vegetables and fruits is associated with increased risk of colorectal cancer (6).

Biliary tract, gall bladder, anal canal, appendix and small bowel malignancies are relatively infrequent and form 13% of all cases of GI malignancies. The mean age at diagnosis for all GI cancers was 58 years and M: F ratio was 1.6:1. It is

true for most of the malignancies except liver and pancreatic cancer, which tends to occur at an older age. Appendicular, anal cancers and small bowel tumors, on the other hand tend to occur in a relatively younger age group in our study. The age distribution in this study is comparable to most of the other studies published from developed countries (3-5, 14, 15). Sex distribution shows a high M: F ratio as seen in most of the other studies. The only exception is anal canal and gall bladder malignancies where the ratio is reversed.

Except for the fact that the high incidence of hepatitis B virus antigenemia explains the pattern of primary liver cancer in our study, the explanation for the pattern of gastric, esophageal and colorectal cancer is still an enigma. Early detection of any type of cancer increases the availability of surgical treatment and in turn decreases the rate of mortality. Because of absence of medical surveillance of cancer patients, especially those with GI cancer, we expected a high occurrence of advanced clinical stages; however, this was confirmed. GIT malignancies in several studies predicted good prognosis if come early, but in this study, two third of the patients came late.

Lastly we want to highlight that it is the first study which depicts the pattern of GI malignancy from Sudan. This study was based on hospital based tumor registries, which has many limitations including a strong referral bias. The pattern of GI malignancies observed in our study is interesting and should provide a stimulus for further research to determine changing of pattern of primary GI malignancies. Further studies of the dietary habits, smoking, environmental factors and the incidence of precancerous gastric and esophageal lesions will be essential to have a better understanding of the current pattern of primary gastrointestinal tract malignancy in Sudan.

5. Conclusions

This study highlights that pancreatic cancer is the most common gastrointestinal malignancy seen followed by hepatocellular carcinoma. We can conclude from this study that analysis of GI malignant tumors showed some interesting and variable features like gastric tumors although rare in developing countries are consistently frequent in our studies.

Sex distribution shows a high M: F ratio. Peak incidence is in slightly younger age group and cases in <20 years age group are also more frequent as compared to Western studies.

Authors' Contribution

K.M. and A.M. were the main investigators and contributed to the study in writing the final draft. A.A analyzed the data and wrote the paper. The authors read and approved the final version of the manuscript and declare that it is not under simultaneous consideration by any other publication.

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