



Retrospective Analysis of Incidence of Gastro-intestinal Malignancies in North-Western India over 5 Years

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Abstract

Introduction: GI cancers constitute a major cancer burden as colorectal cancer (CRC) ranks second, gastric cancer ranks third and esophageal cancer ranks sixth cause of cancer mortality worldwide. Though most commonly seen in fifth to seventh decade, rate is increasing also in younger population particularly for CRC. The incidence of gastric cancers has been decreasing for a century, but there has been a marked increase in the incidence of gastro-esophageal junction and of primary liver cancers. Incidence of gastric cancers varies widely among the various regions within India due to diverse culture and related food habits. The etiology of gastric cancers is multi-factorial and various dietary and environmental factors have been attributed.

Materials and Methods: Five-year retrospective data on Gastro-intestinal Malignancies incidence were obtained from the Hospital Based Cancer Registry of Regional Cancer Centre (RCC), Bikaner, from January 2015 to December 2019. Linear regression method was applied to

determine the trend of GIT malignancy incidence over these five years.

Results: GIT malignancy contributed 11.2% of total 53937 cases registered at RCC, Bikaner from January 2015 to December 2019. Among these, there were 3187 males and 2758 females which contributed approximately 5.9% and 5.11% of all male and female cancer cases. Linear regression analysis showed an increasing trend of Gall bladder cancer incidence over 5 years. The highest incidence rate was found in the districts of Bikaner, Sri Ganganagar, Hanumangarh and Churu among which the maximum cases were reported from Bikaner district.

Conclusion: GIC cases have shown an increasing trend in the past 5 years in the state of Rajasthan with higher incidence in the North-Western districts irrigated by canal water. There is need to correlate the water chemistry and control modifiable risk factors for reducing incidence and mortality of GIC in Rajasthan.

Keywords: Bikaner, Gastro-intestinal cancer, Rajasthan, Trend

Introduction

Cancer ranks as a leading cause of death and an important barrier to increasing life expectancy in every country of the world.¹Gastrointestinal (GI) cancer continues to be a common health problem. Approximately 44,87,227 new cases of GI malignant disease were occur worldwide in 2020 with an associated 35,24,932 deaths.² Although colorectal tumors account for almost 50% of the cases in the United States (140,250), cancers of the esophagus, stomach, liver, and pancreas continue to occur with regularity and have high mortality rates, and the incidence of hepatoma is increasing rapidly. Although the death rate from colon and rectal cancer is overall gradually decreasing, there has been a recent increase in the incidence of these tumors in the younger patient. The incidence of gastric cancer has been decreasing for a century, but there has been a marked increase in the incidence of gastro-esophageal junction and of primary liver cancers^{3,4}. Pancreatic cancer also increase gradually in incidence and there has been little improvement in overall survival rates³. Gastric and hepatic cancers are two of the most common causes of cancer incidence and death worldwide. Hereditary factors play a role in the etiology of GI cancer; environmental toxins are causative agents in certain diseases. Because these are a diverse group of tumors, the etiology, epidemiology, diagnosis, and treatment vary enormously between diseases.

Materials and Methods

It was a single-center, retrospective study which involved 5-year data of GIC incidence from the Hospital-Based Cancer Registry (HBCR) of Regional Cancer Centre (RCC), Bikaner, India, from January 2015 to December

2019. Being a retrospective study, no ethical approval was required for the study as all the patients were treated with the standard departmental protocol.

Patients included in the study were those who were diagnosed with GIT malignancy above the age of 20 years irrespective of the stage and histology. Patients from outside the state of Rajasthan or patients with second malignancies were excluded from the study. A total of 5955 GIC cases were collected. The district-wise distribution of GIC was also mapped.

Statistical analysis

Linear regression method was applied to determine the trend of GIT malignancy incidence over these 5 years as well as to predict the incidence over the next 5 years until the year 2023 using Graph Pad Prism, version 6.0.

Results

GIT malignancy contributed 11.22% of total cancer cases (n = 53937) registered at RCC, Bikaner. from January 2015 to December 2019 (figure1). In the last 5 years,5945 GIC cases, with a male(n=3187)-to-female(n=2758) ratio of 1:1.86 were registered which contributed approximately 5.9% and 5.11% of all male and female cancer cases (figure 2). Linear regression analysis showed an increasing trend of GBC incidence over 5 years. The area-wise distribution showed a high incidence rate in the districts of Bikaner, Sri Ganganagar, Hanumangarh, and Churu among which the maximum cases were reported from Bikaner district

Discussion

The time trend analysis revealed a significant increase in GIC over 5-year period in Rajasthan among both genders, with other population registers in India showing similar increasing trend. Male predominance has been reported within the country as well as worldwide. The majority cases were diagnosed in the fifth to seventh

decades, which confirmed to a study reported from Delhi⁵. It has long been known that colon and rectal cancers are related to dietary factors, and these tumors have therefore been used as a model for cancer epidemiology. There is a strong association of colorectal tumors with high-fat and low-fiber diet^{6,7}. It has been argued whether high fat or low fiber is most important in the process of cancer development, or whether other nutrients associated with these diets are most important. However, data now suggest that neither high fat nor low fiber is critical but rather that high-fat/low-fiber diets tend to be low in nutrients such as folate.

Confirmation of this is critical in designing prevention strategies because dietary supplementation is far easier to implement than is a major change in the eating habits of the population. Other environmental factors, specifically exercise, are important in colorectal carcinogenesis, perhaps related to alterations in insulin-like growth factors. It is fortunate that a lifestyle that is healthy for the heart is also beneficial in decreasing colorectal cancer incidence. The same strong dietary correlate with cancer formation is unfortunately not present for most other GI tract tumors. Smoking is a major risk factor, primarily for esophageal cancer, and, to a lesser extent, for pancreatic cancer⁸. Along with the dietary factors just described, there have been major epidemiologic changes in geographic location and histo-pathologic findings for tumors of the esophagus, stomach, colon, and rectum over the last half-century, although the reason for these changes is largely unknown.

The primary histo-pathological type of esophageal cancer has changed rapidly from squamous cell carcinoma of the proximal and mid-esophagus to adenocarcinomas of the distal esophagus, gastro-esophageal junction, and proximal stomach⁹. At many institutions in the United

States three-fourths of all patients with esophageal cancer have distal esophageal/gastro-esophageal junction adenocarcinomas, although this was a relatively rare entity perhaps 30 years ago. The reasons for these changes are uncertain, but are likely related to the increased incidence of Barrett's esophagus and esophageal reflux. One theory is that the increased use of H2-receptor blockers has relieved the symptoms of reflux but has not decreased the inflammatory response in the distal esophageal mucosa, so that Barrett's lesions continue to form and undergo metaplastic changes to become esophageal cancers¹⁰.

The concomitant substantial increase in the incidence of proximal (cardia) gastric cancers suggests that a similar etiology is present for both cardia and gastro-esophageal junction carcinomas and that the increased incidence of esophageal cancers is not simply a misclassification of proximal gastric cancers as esophageal adenocarcinomas¹¹. At the same time that there has been an increased incidence of proximal gastric adenocarcinomas, the overall incidence of gastric cancers is decreasing. At the beginning of the 20th century, gastric cancer was the most common malignant disease in the United States. Although gastric cancer is still a common cause of death, it has decreased in incidence so much that it is now only the 11th most common cause of death from cancer in the United States. The change has been attributed to dietary modifications, although the exact cause is unknown. The incidence of gastric cancer worldwide is much higher than in the United States, especially in Asia. In the large bowel, there has been a more gradual epidemiologic change. Previously, the majority of colorectal cancers were located in the rectum, but now most are located in the right colon. Although screening for, and removal of, precancerous polyps in the

rectum and sigmoid colon with sigmoidoscopy could be producing some of these changes, it is unlikely to be a major factor. Dietary changes are suspected, but unproved, as a cause. There has also been a major increase in the incidence of hepatocellular carcinoma (HCC) in the United States, although it is not nearly as high as the incidence is worldwide¹².

Some of the reasons for this are known, such as the strong association of HCC with hepatitis B and C virus infection. Improved prevention and treatment of hepatitis B and C infections should decrease the incidence of these diseases over the long term. However, a variety of causes, including alcohol and fatty liver infiltration, produce inflammatory changes in the liver that can lead to cirrhosis and subsequent HCC formation. A major emphasis in the future will be to determine ways to prevent tumor formation or to find tumors early enough so that the risk of tumor mortality is minimized. Data strongly suggest that prevention strategies can be used to decrease the incidence of colorectal cancers. Screening for and removal of polyps before they become malignant interferes with the polyp-to-cancer sequence that occurs in the majority of colon and rectal cancers. Studies of patients screened with flexible sigmoidoscopy have demonstrated a decreased incidence of cancers areas within reach of the sigmoidoscope, but no decrease in areas that could not be effectively screened¹³. Convincing data demonstrate the value of regular screening and stool guaiac studies in decreasing colorectal cancer mortality rates. However, neither of these interventions is used widely enough to decrease markedly the overall incidence of these diseases. Virtual colonoscopy, a computed tomography (CT)-based radiographic examination, has generated interest as a screening tool¹⁴. However, the data do not yet support its widespread use

and patients currently still need to do what many consider to be the worst part of an endoscopic procedure, the bowel preparation. Controlled studies are being performed to determine whether the bowel preparation is necessary or whether electronic deletion techniques can be used to exclude stool from the images. Screening approaches have also been considered for tumors of other sites in the GI tract, but cost-effective strategies have not been defined¹⁵.

The incidence of gastric cancer in the United States and many Western countries is not high enough to justify the cost and morbidity of screening endoscopy for gastric or esophageal cancer, and radiographic studies such as CT scans are not sensitive. If it were possible to define a high-risk group of patients, then perhaps screening could be used successfully. Although controversial, the one other situation in the upper GI tract in which screening may be useful is in patients with Barrett's esophagus, where the incidence of esophageal cancer is high and regular endoscopy or elective surgery may be justified, at least for high-grade dysplastic lesions. However, a great deal of disagreement exists in the gastroenterology community as to the proper frequency of screening and the best management of high-grade dysplasia¹⁶. Prevention strategies have been studied extensively, especially for colon and rectal cancers¹⁷. A variety of agents have potential as preventive agents for people at high risk. These include aspirin and other nonsteroidal anti-inflammatory drugs (NSAIDs) and calcium^{18,19}. The data are quite convincing that the incidence of polyps can be decreased with the use of NSAIDs, presumably reflecting their activity as inhibitors of cyclo-oxygenase-2 (COX-2)²⁰. The finding of increased cardiovascular events in patients taking selective COX-2 inhibitors will

have a major impact on the use of these agents for cancer prevention.

Limitation

Data in the present study have been obtained from a HBCR of RCC, Bikaner and might not represent the extra area wise distribution of GIC cases in the state.

Conclusion

GIC cases have shown an increasing trend in the past 5 years in the state of Rajasthan. High incidence is seen in the North-Western districts irrigated by canal water. There is a need to analyze and identify various heavy metal carcinogens in the water and control the modifiable risk factors for reducing the incidence and mortality of GIC in Rajasthan.

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Figure 1

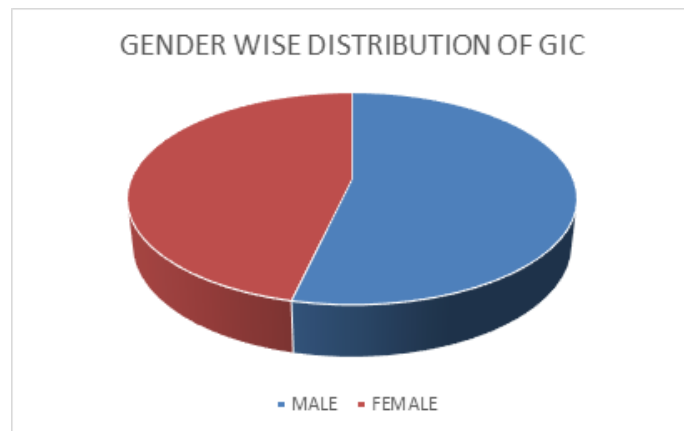


Figure 2

