Mortality Trends of Gastrointestinal, Liver, and Pancreaticobiliary Diseases: A Hospital-Based Prospective Study in the Southeast of Iran

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Abstract

Background:
Gastrointestinal (GI), liver, and pancreaticobiliary diseases, in addition to the high health care utilization, account for a significant proportion of disability and death in Iran. We aimed to assess the incidence of in-hospital mortality for the total GI, liver, and pancreaticobiliary diseases in all hospitals in Kerman, Iran.

Methods:
In a cross-sectional study from May 2017 to April 2018, we collected the data of in-hospital death records due to GI, liver, and pancreaticobiliary diseases in all hospitals in Kerman city. GI and liver diseases were classified into three main categories: 1. Non-malignant GI diseases, 2. Non-malignant liver and pancreaticobiliary diseases, and 3. GI, liver, and pancreaticobiliary malignancies. All data were analyzed using SPSS software, version 22 (IBM).

Results:
Of 3427 in-hospital mortality, 269 (7.84%) deaths were due to GI, liver, and pancreaticobiliary diseases, of which 82 (30.48%) were related to non-malignant GI disorders, 92 (34.20%) to the non-malignant liver and pancreaticobiliary diseases, and 95 (35.31%) were associated with GI, liver and pancreaticobiliary malignancies. Most patients were male (62.08%), and the most common age was between 60-80 years (40.5%). GI bleeding occurred in 158 (58.73%) patients, and variceal bleeding was the most common cause (28.48%). Additionally, cirrhosis was reported in 41 out of 92 (44.56%), and hepatitis B virus (HBV) was the most common cause of cirrhosis among 17 out of 41 (41.46%).

Conclusion:
Our results show that gastric, colorectal, and pancreatic cancers and cirrhosis due to HBV were the most common causes of mortality associated with GI, liver, and pancreaticobiliary diseases in the hospitals of Kerman.

Keywords:
Gastrointestinal tract, Liver, Pancreas, Mortality, Iran

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Introduction

Gastrointestinal (GI), liver, and pancreaticobiliary diseases are the major causes of global morbidity and mortality involving all ages.[1,2] Some of these diseases are potentially life-threatening or disabling. They cause nearly up to 8 million deaths per year worldwide.[3] In a study by Farthing et al in 2008, GI disease accounted for more than 90 000 mortality across Europe.[4]

Recent studies have shown that the epidemiology of these diseases has changed over time.[2-5] In 2019, a study by Peery et al revealed that the incidence and mortality from colorectal cancer (CRC) decreased among the elderly in the United States, while the incidence of CRC has slightly increased in young adults.[2] Another survey by Chan et al in Hong Kong demonstrated that from 2005 to 2014, increased hospitalization of GI cancers and Crohn's disease happened while there was a decline in the mortality rate of other GI diseases.[5] Some studies in Iran show an increase in the incidence and mortality of GI malignancies, especially gastric and pancreatic cancer.[6,7] However, up to now, no study has been done in Iran to estimate the overall hospitalization and mortality of GI, liver, and pancreaticobiliary diseases.

In this study, the incidence of in-hospital mortality for all GI, liver, and pancreaticobiliary diseases has been assessed by using data from all hospitals in Kerman, the center of the largest province in Iran.

Materials and Methods

Study population and patient information

In this cross-sectional study, 3427 in-hospital mortality reports in over 14 years old patients from May 2017 to April 2018 in all hospitals of Kerman, of which 269 cases were secondary to GI and hepato-biliary causes, were collected according to the 10th edition of the International Classification of Diseases (ICD-10). Through this study, the documents of daily deaths were recorded in hospitalized patients, especially those who were admitted to hospitals for GI and liver diseases and eventually died, or GI and liver diseases occurred during hospitalization and resulted in death. It should be mentioned that due to incomplete documents in the registry of hospitals, some physicians in each hospital call the therapist physicians of dead patients and question about details of GI, liver, and pancreaticobiliary diseases that cause the death. Furthermore, demographic data were collected from medical records. If the etiology of death was unknown or in doubt, the patient was excluded from the study.

GI and liver disease were classified into three groups. The first group was patients with non-malignant GI diseases, including peptic ulcer disease (PUD), inflammatory bowel disease, mesenteric ischemia, appendicitis, peritonitis, GI obstruction, and others. The second group included patients who suffered from non-malignant liver and pancreaticobiliary diseases such as cirrhosis, biliary stone-related disease, hepatitis, gall bladder stone, Budd-Chiari syndrome, pancreatitis, and others. The third group includes patients who have at least one type of GI, liver, and pancreaticobiliary malignancy, whose involvement can be in the esophageal, stomach, small intestine, large intestine, anus, liver, pancreas, and biliary system.

Statistical analysis

All data were evaluated using the SPSS software, version 22 (IBM), and GraphPad Prism, version 8.0.2 (GraphPad Software, Inc.). Frequency and percentage were used for categorizing qualitative variables.

Results

Out of 3427 in-hospital mortality records from May 2017 to April 2018, 269 (7.84%) GI and liver disease-related mortalities were reported. Among 269 deaths, 59 (21.93%) GI and liver diseases occurred during admission and caused death. Mortality happened in males more than in females (62.09% versus 37.91%), and most mortalities happened in people aged 60-80 years (40.52 %). All demographic characteristics related to mortality from GI and liver diseases have been summarized in Table 1.

The most recent condition reported among 269 patients who died was hypovolemic shock in 30

Table 1. Demographic characteristics of mortality caused by GI, liver, and pancreaticobiliary diseases

Variable		No.	%
Gender	Male	167	62.08
	Female	102	37.91
Age	14-20	8	2.97
	21-40	20	7.43
	40-60	46	17.1
	60-80	109	40.52
	>80	86	31.97

(11.15%), hepatic encephalopathy in 32 (11.89%), sepsis and multi-organ failure in 168 (62.45%), and cardiovascular events in 39 patients (14.49%).

GI bleeding occurred in 158 out of 269 (58.73%) patients, 112 (70.88%) on admission, and 46 (29.11%) during hospitalization. Variceal bleeding in 45 (28.48%), GI malignancy in 33 (20.89%), unknown origin bleeding in 32 (20.25%), and PUD in 20 (12.66%) patients composed the most common causes of GI bleeding, respectively. The etiologies of GI bleeding have been summarized in Figure 1.

Among 269 GI and liver disease-related mortalities, 82 (30.48%) were related to non-malignant GI disorders, 92 (34.20%) to the non-malignant liver and pancreaticobiliary diseases, and 95 (35.31%) were related to GI and liver malignancies. More details of GI and liver disease mortalities have been summarized in Table 2.

Cirrhosis was reported in 41 out of 92 (44.56%) patients. The most etiology was related to hepatitis B (41.46%), hepatitis C (19.51%), and autoimmune hepatitis (9.76%). More details of cirrhosis have been summarized in Figure 2.

Discussion

Our study showed GI and liver diseases compose at least 7.84% of all hospital mortalities in Kerman and seems to be the third cause of death after cardiovascular disease and trauma.

According to the results of this study, in-hospital GI-related mortality was mainly caused by malignant GI, pancreatic, and liver diseases and related complications. Our result was consistent with Malekzadeh and colleagues, who estimated the global burden of GI and liver disease from 1990 to 2010 in 187 countries. According to that report, 7.8% and 7.6% of all deaths in males and females were due to GI and liver diseases, respectively. Besides, gastric cancer is the most common cause of GI-related mortalities, especially in those above 50 years old.[1] Gastric cancer is the fifth most prevalent malignancy and the third cause of cancer mortality worldwide.[8] Although the incidence of gastric cancer has recently decreased in the world; it is the most common GI cancer in Iran.[9,10] High prevalence of *Helicobacter pylori* infection, high salt diet, and smoking are the main risk factors for gastric cancer in Iran.[11,12] In a study by Narimani Moghadam, consistent with other studies in Iran, the 5-year survival rate in 399 patients with gastric cancer was 30%.[12,13] However, this 5-year survival rate was reported 54-58% in southeast Asia and developed countries.[14] This discrepancy may be due to late diagnosis in patients in Iran, which usually occurs in higher stages of the disease.[15]

Although the incidence of CRCs in Iran is lower than the other developed countries, it has increased significantly in recent decades.[16,17] In a systematic review and meta-analysis in Iran in 2019, the overall 5-year survival rates of CRC were 54%, being lower than the developed countries.[18,19] Poor accessibility of screening tests in developing countries can cause a delay in the diagnosis of precancerous lesions and, as a result, can increase the incidence of CRC in advanced stages.[20]

An epidemiological review in 2019 showed that the incidence and mortality rate of pancreatic cancer is increasing in Iran.[21] In a recent prospective study of

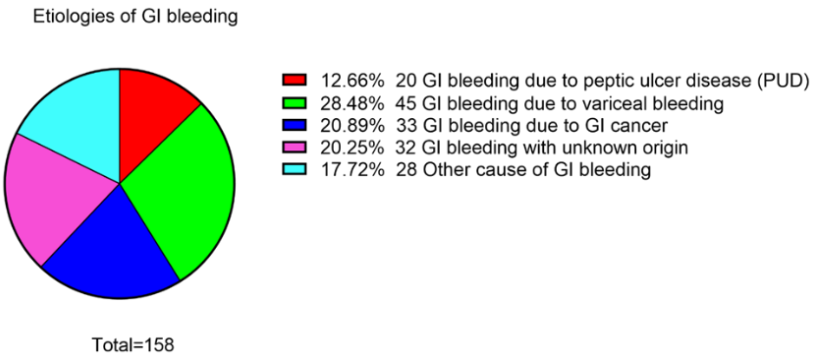

Figure 1. Frequency and etiologies of gastrointestinal bleeding in all mortality caused by gastrointestinal, liver, and pancreaticobiliary diseases from May 2017 to April 2018

461 patients with pancreatic cancer in Iran, the average survival time in these patients was about 6.2 months. The 1 and 5-year survival rates in this study were 26.2% and 1.5%, respectively.[22] The 5-year survival rate of pancreatic cancer in Iran is less than the developed countries.[14] Besides delayed diagnosis, opium use is an independent risk factor that may associate with a high mortality rate among pancreatic patients in Iran.[23]

In addition, in this study, cirrhosis and complications were the most prevalent types of in-hospital mortality in non-malignant GI, pancreatic, and liver diseases. This result was consistent with western society, in which chronic liver disease is the most common cause of non-malignant GI, pancreatic, and liver diseases.[1] However, the most common etiology of cirrhosis in our study was viral hepatitis, especially hepatitis B virus (HBV).[24,25] In contrast to the results of our study, non-alcoholic steatohepatitis and alcoholic hepatitis in developed countries have been reported as the main cause of cirrhosis.[24] These results could be expected because alcohol is prohibited in many countries in the Middle East, such as Iran, and viral hepatitis, including hepatitis B and C are still the main causes of cirrhosis, particularly in developing countries.[24,25]

Finally, in our study GI bleeding occurred in 158 (58.73%) patients besides hypovolemic shock in 30 (11.15%). So, GI bleeding was prevalent in more than half of death-related GI, pancreatic, and liver diseases. Among these, variceal bleeding, malignancy, and PUD composed the most common causes of GI bleeding, respectively. A noteworthy point in the results of western studies was the mortality rate due to GI bleeding, which is estimated to be between 6-11% and has decreased significantly over time.[26-28] Various factors such as *H. pylori* eradication and recent developments of endoscopic devices for GI bleeding management may have contributed to decreasing GI bleeding mortality in developed societies.[26–29]

The strength of our study was that, unlike other studies, it was performed prospectively and also included an examination of all GI, liver, and pancreaticobiliary diseases that cause death. A valuable registry system seems essential to update information on disease burden. Until now, disease registration in Iran is limited to a few cancer registration centers or referral hospitals.

In conclusion, according to this study, gastric cancer, CRC, pancreatic cancer, and cirrhosis due to HBV and HCV were the most common etiologies of mortality related to GI, liver, and pancreaticobiliary diseases in Kerman. Most of these diseases are preventable and/or curable. This means that the health care strategy

Table 2. The causes of mortality in patients with GI, liver, and pancreaticobiliary diseases

The causes of mortality	Subcategories	No.	%
Non-malignant gastrointestinal disorders, n=82 (30.48%)	Peptic ulcer	20	24.39
	Inflammatory bowel disease	2	2.43
	Mesenteric ischemia	13	15.85
	Peritonitis	20	24.39
	Non-malignancy-induced bowel obstruction	17	20.73
	Others	10	12.19
Non-malignant liver and pancreaticobiliary disease, n=92 (34.20%)	Cholangitis	16	17.39
	Cirrhosis	41	44.56
	Acute liver failure	10	10.86
	Acute cholecystitis	3	3.26
	Budd Chiari	2	2.17
	Acute pancreatitis	12	13.04
	Others	8	8.69
Malignancies, n=95 (35.31%)	Esophageal cancer	8	8.42
	Gastric cancer	30	31.57
	Small intestinal cancer	1	1.05
	Colorectal cancer	20	21.05
	Pancreas cancer	14	14.73
	Hepatocellular cancer	6	6.31
	Cholangiocarcinoma	8	8.42
	Unknown origin	8	8.42

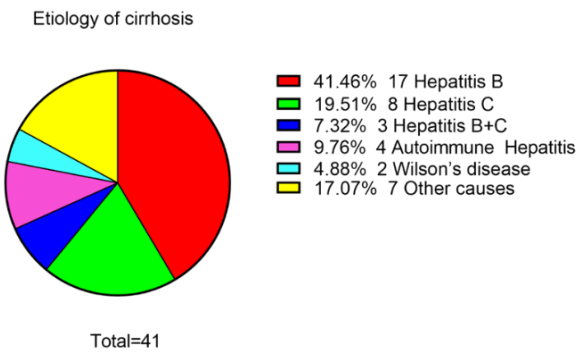

Figure 2. Frequency and etiology of cirrhosis in patients with liver diseases

should concentrate on early prevention, diagnosis, and treatment of the above diseases that seem to be important causes of mortality in Iranian society. However, for better investigation, it is suggested that similar studies should be performed and repeated periodically in other societies for a better assessment of mortality trends of GI, liver, and pancreaticobiliary diseases during the time.

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Conflict of Interest

The authors declare no conflict of interest related to this work.

Ethical Approval

The project received approval from the Ethics Committee of the Kerman University of Medical Sciences, Kerman, Iran, under number IR.KMU.REC.1392.542

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