

RESEARCH ARTICLE

Incidence, Survival and Prevalence of Esophageal and Gastric Cancer in Linzhou City from 2003 to 2009

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Abstract

This study describes recent trends in incidence, survival and prevalence of subgroups of esophageal and gastric cancer in Linzhou city between 2003 and 2009. Data of esophageal and gastric cancer for the period of interest were extracted from the Linzhou Cancer Registry. Using information on tumor morphology or anatomical site, data were divided into six groups; esophageal squamous cell carcinoma, esophageal adenocarcinoma, other and unspecified types of esophageal cancer, and cardia, non-cardia, and unspecified anatomical site of stomach cancer. Incidence, survival and prevalence rates for each of the six cancer groups were calculated. The majority of esophageal cancers were squamous cell carcinomas (82%). Cardiac cancer was the major gastric cancer group (64%). The incidence of esophageal squamous cell carcinoma and gastric cardiac cancer increased between 2003 and 2009. Both esophageal and gastric cancer had a higher incidence in males compared with females. Overall survival was poor in all sub-groups with 1 year survival ranging from 45.9 to 65.6% and 5 year survival ranging from 14.7 to 30.5%. Prevalence of esophageal squamous cell carcinoma and gastric cardiac cancer was high (accounting for 80% overall). An increased focus on prevention and early diagnosis, especially in esophageal squamous cell carcinoma and gastric cardiac cancer, is required.

Keywords: Esophageal cancer - gastric cancer - incidence - prevalence - survival - linzhou

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Introduction

In 2009, esophageal and gastric cancer was the fifth and second most common cancer in China, with age-standardized incidence rates of around 23.9 and 14.8 per 100,000, respectively (Jie et al., 2012). Despite the declining trend in the incidence of these two cancers in Linzhou city from 1988 to 2003 it was still the first two most common cancer in Linzhou city in 2009 (Sun et al., 2007; Jie et al., 2012). Stable or upward trend of mortality of the esophageal and gastric cancer was reported in Linzhou city by comparing period 2006-2010 with 2001-2005 (Liu et al., 2012; Liu et al., 2013).

In Asia, the incidence of esophageal squamous cell carcinoma has declined in past decades because of socioeconomic level elevation and lifestyle modification (Kamangar et al., 2009). And the declining incidence of gastric cancers may be associated with the decreasing prevalence of *Helicobacter pylori* infection (Brenner et al., 2009). However, the incidence of esophageal adenocarcinoma and the gastric cardiac cancer have been increasing in many western countries over the last 30 years (Hansson et al., 1993; Thrift et al., 2012; Hur et al., 2013).

In China, an increasing trend of these two subgroups of esophageal and gastric cancer was also reported (Fan et al., 2008; He et al., 2008).

Due to the different incidence trend of subgroups of esophageal and gastric cancer, more detailed analysis of the cancer incidence in Linzhou city need to be explored. This article provides an overview of subgroups of esophagogastric cancer statistics of Linzhou city, including the incidence, survival and prevalence rates between 2003 and 2009.

Materials and Methods

In this study, data of esophageal and gastric cancer (6,175 males; 3,896 females) in Linzhou city between 2003 and 2009 were extracted from the Linzhou Cancer Registry. These data were divided into six groups: 1. esophageal squamous cell carcinoma (morphology code 8050-8083), 2. esophageal adenocarcinoma (morphology code 8140-8576), 3. other and unspecified types of esophageal cancer (morphology code 8000), 4. cardia (C16.0), 5. non-cardia (C16.1-C16.6) 6. unspecified anatomical site of stomach cancer (C16.8-C16.9).

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Table 1. Esophageal Cancer by Anatomical Site and Histology in Linzhou City Between 2003 and 2009

	Upper and middle	Lower	Unspecified anatomical site
Squamous cell carcinoma	2512(86.5)	482(84.9)	1363(73.2)
Adenocarcinoma	36(1.2)	14(2.5)	15(0.8)
Other and unspecified types	356(12.3)	72(12.7)	484(26.0)

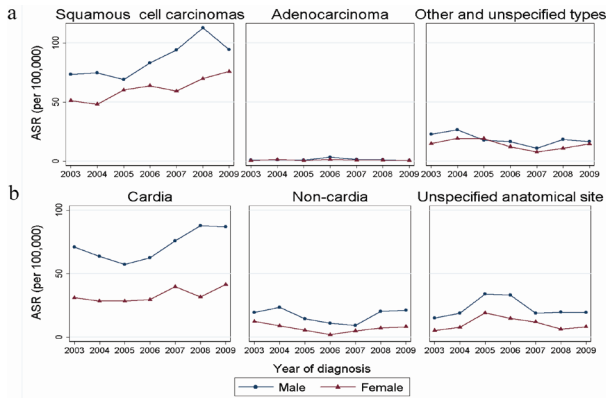


Figure 1. Age-standardized Incidence Rates of Esophageal Cancer (a) and Gastric Cancer (b) in Linzhou City Between 2003 and 2009

In western countries, as the majority of esophageal adenocarcinoma is found in the lower third of the esophagus and squamous cell carcinoma is more commonly found in the upper and middle esophagus, patients with an esophageal cancer of unspecified anatomical site can be assigned to the upper and middle or lower esophageal subgroups based on their histological diagnosis (Coupland et al., 2012). However in Linzhou city squamous cell carcinoma is commonly found in either upper and middle or lower site of the esophagus (Table 1). For comparison with other studies, we separated esophageal cancer by histology and gastric cancer by anatomical site.

For each cancer group age specific incidence rates were calculated in 5 year age groups ranging from 0-4 through to 85 and over for males and females. Age standardized incidence rates were calculated for each of the six cancer groups by year of diagnosis and sex according to the Segi's population expressed per 100 000 populations.

Survival was estimated using the Kaplan-Meier method for each of the six groups. Survival was based on patients diagnosed between 2003 and 2009 and followed up until the end of 2011.

Using cancer incidence database data from 2003 to 2009, we defined prevalent cases on January 1, 2010 as patients who were diagnosed between January 1, 2003 and December 31, 2009 and who were alive on January 1, 2010. Then Crude prevalence rate can be calculated as number of prevalent cases divided by the corresponding population.

Results

Esophageal squamous cell carcinoma

The majority of esophageal cancers were squamous cell carcinoma, and over half were in males (Table 2). The median age at diagnosis was 61 years and the number of

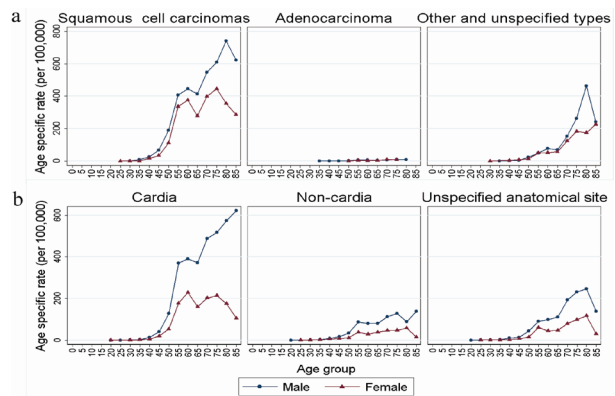


Figure 2. Age Specific Incidence Rates of Esophageal Cancer (a) and Gastric Cancer (b) in Linzhou City Between 2003 and 2009

cases increased from 2004 to 2008. The incidence rose from 73.4 per 100,000 in 2003 to 94.4 in 2009 for males and from 51.3 to 76.0 for females (Figure 1). The age specific incidence rates were similar in males and females and increased great over age (Figure 2). 64.1% [95% confidence interval 62.6-65.5%] of patients survived 1 year and 30.5% [29.1-32.0%] survived five years after diagnosis (Figure 3). The prevalence rates were 205.7 and 167.8 per 100,000 in males and females, respectively (Table 3).

Esophageal adenocarcinoma

A small proportion (1%) of esophageal cancer patients had adenocarcinoma disease and almost two third was in males (Table 2). The median age at diagnosis was 61. The incidence was relatively stable over the period for both males and females (Figure 1). The age specific incidence rates were similar in males and females and not increased over age (Figure 2). 65.6% [95% confidence interval 52.6-75.8%] of patients survived 1 year and 28.3% [17.6-40.0%] survived five years after diagnosis (Figure 3). The prevalence rates were 2.3 and 2.4 per 100,000 in males and females, respectively (Table 3).

Other and unspecified types of esophageal cancer

17.1% of esophageal cancer patients were disease of other and unspecified types and the median age at diagnosis was 68 (Table 2). The incidence was stable over the period. Age specific incidence rates were similar in males and females and increased over age (Figure 1 and 2). 49.5% [95% confidence interval 46.2-52.7%] of patients survived 1 year and 18.2% [15.7-20.9%] survived five years after diagnosis (Figure 3). The prevalence rates were 18.9 and 28.2 per 100,000 in males and females, respectively (Table 3).

Cardia

The majority of stomach cancers were located in cardia, and like esophageal adenocarcinoma two third was in males (Table 2). The median age at diagnosis was 62. Incidence increased over the period rising from 71.0 to 86.8 per 100,000 in males and from 31.2 to 41.7 in females (Figure 1). Age specific incidence rate increased fast in males than in females (Figure 2). 62.7% [95% confidence

Table 2. Characteristics of Esophago-gastric Cancers in Linzhou City Between 2003 and 2009

	Esophageal squamous cell carcinoma	Esophageal adenocarcinoma	Other and unspecified types of esophageal cancer	Cardia	Non-cardia	Unspecified anatomical site of Stomach cancer	Esophageal and gastric cancer
Cases	4357	65	912	3013	734	990	10071
Male	2477(56.9)	39(60.0)	485(53.2)	2014(66.8)	501(68.3)	659(66.6)	6175(61.3)
Female	1880(43.2)	26(40.0)	427(46.8)	999(33.2)	233(31.7)	331(33.4)	3896(38.7)
Median age	61	61	68	62	60	63	62
< 50	418(9.6)	5(7.7)	65(7.1)	226(7.5)	121(16.5)	107(10.8)	942(9.4)
50-54	652(15.0)	8(12.3)	82(9.0)	391(13.0)	96(13.1)	127(12.8)	1356(13.5)
55-59	796(18.3)	13(20.0)	108(11.8)	587(19.5)	135(18.4)	161(16.3)	1800(17.9)
60-64	779(17.9)	11(16.9)	125(13.7)	588(19.5)	104(14.2)	137(13.8)	1744(17.3)
65-69	605(13.9)	9(13.9)	112(12.3)	460(15.3)	103(14.0)	138(13.9)	1427(14.2)
70-74	579(13.3)	11(16.9)	171(18.8)	414(13.7)	95(12.9)	163(16.5)	1433(14.2)
75-79	349(8.0)	7(10.8)	147(16.1)	231(7.7)	55(7.5)	104(10.5)	893(8.9)
80-84	142(3.3)	1(1.5)	80(8.8)	91(3.0)	20(2.7)	47(4.8)	381(3.8)
85+	37(0.9)	0(0)	22(2.4)	25(0.8)	5(0.7)	6(0.6)	95(0.9)
Year of diagnosis							
2003	547(12.6)	5(7.7)	150(16.5)	433(14.4)	138(18.8)	88(8.9)	1361(13.5)
2004	524(12.0)	11(16.9)	198(21.7)	380(12.6)	143(19.5)	121(12.2)	1377(13.7)
2005	535(12.3)	6(9.2)	135(14.8)	335(11.1)	77(10.5)	219(22.1)	1307(13.0)
2006	612(14.1)	18(27.7)	120(13.2)	378(12.6)	62(8.5)	201(20.3)	1391(13.8)
2007	653(15.0)	11(16.9)	74(8.1)	484(16.1)	65(8.9)	134(13.5)	1421(14.1)
2008	771(17.7)	9(13.9)	109(12.0)	475(15.8)	119(16.2)	110(11.1)	1593(15.8)
2009	715(16.4)	5(7.7)	126(13.8)	528(17.5)	130(17.7)	117(11.8)	1621(16.1)

Table 3. Cancer Prevalence on January 1, 2010 in Linzhou City by Sex (per 100,000)

	Both	Male	Female
Esophageal squamous cell carcinoma	187.2	205.7	167.8
Esophageal adenocarcinoma	2.3	2.3	2.4
Other and unspecified types of esophageal cancer	23.4	18.9	28.2
Cardia	119.7	157.9	79.7
Non-cardia	26.4	36.4	16.1
Unspecified anatomical site of Stomach cancer	23.1	29.7	16.1
Esophageal and gastric cancer	382.2	450.9	310.2

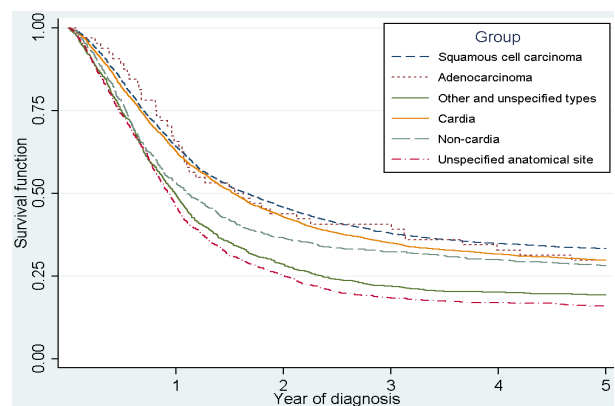
interval 60.9-64.4%] of patients survived 1 year and 26.6% [24.9-28.4%] survived five years after diagnosis (Figure 3). The prevalence rates were 157.9 and 79.7 per 100,000 in males and females, respectively (Table 3).

Non-cardia

Sixty-eight percent of non-cardia stomach cancers were in males (Table 2). The median age at diagnosis was 60. Incidence decreased before 2007 and increased after that (Figure 1). The age specific incidence rates were similar in males and females and increased slightly over age (Figure 2). 53.2% [95% confidence interval 49.5-56.7%] of patients survived 1 year and 25.6% [22.2-29.0%] survived five years after diagnosis (Figure 3). The prevalence rates were 36.4 and 16.1 per 100,000 in males and females, respectively (Table 3).

Unspecified anatomical site of Stomach cancer

20.9% of stomach cancers were located in unspecified anatomical site (Table 2). The median age at diagnosis was 60. Incidence increased first and decreased again. Incidence was higher in males and increased over age (Figure 1 and 2). 45.9% [95% confidence interval 42.7-49.0%] of patients survived 1 year and 14.7% [12.5-17.1%] survived five years after diagnosis (Figure 3). The prevalence rates were 29.7 and 16.1 per 100,000 in males and females, respectively (Table 3).

**Figure 3. Kaplan-Meier Survival Functions for Esophageal Cancer and Gastric Cancer in Linzhou City Between 2003 and 2009**

Discussion

Our study investigated the incidence, survival and prevalence of the subgroups of esophageal and gastric cancers in Linzhou city between 2003 and 2009. The majority of esophageal cancer was squamous cell carcinoma (82%). Gastric cardiac cancer was the largest gastric cancer group (64%). Esophageal squamous cell carcinoma and cardia cancer increased over the period. The incidence was higher in males compared with females for both esophageal and gastric cancer.

Downward trends of esophageal and gastric cancer in Linzhou can be most attributed to decreasing risks with socioeconomic level elevation and lifestyle modification, like intake of pickled or salted vegetables, preference for a high salt diet and prevalence of *Helicobacter pylori* infection (Xibin et al., 2002; Xibib et al., 2003). However, some other risk factors will play a more important role with lifestyles changed. Smoking and high alcohol consumption is risk factors for esophageal squamous cell carcinoma and gastric cancer (Lagergren et al.,

2010). In China, 23.9% of esophageal cancer deaths were attributable to tobacco smoking and alcohol drinking, much less than about 80% in western country (Wang et al., 2012). The findings that obesity contributes to the risk of gastric cardiac cancer, especially among men, were also reported in china (Ji et al., 1997). Public health initiatives aimed at reducing smoking, encouraging sensible alcohol consumption and reducing obesity would help reduce the incidence of these cancers.

Overall survival was poor in all sub-groups with 1 year survival ranging from 45.9 to 65.6% and 5 year survival ranging from 14.7 to 30.5%. The poor prognosis of these cancers highlights the need to concentrate efforts on primary prevention. Prevalence statistics indicate the demand for cancer care and the need for cancer surveillance and are important considerations for health-care planning and service delivery. In Linzhou city, prevalence in esophageal squamous cell carcinoma and cardia cancer was high (account for 80% overall esophageal and gastric cancer).

An increased focus on prevention and early diagnosis, especially in esophageal squamous cell carcinoma and gastric cardiac cancer, is required. Further study also should be carried out to confirm the trend overcoming the shortages of the relative short time and high proportion of unspecified type or site in esophageal and gastric cancer in our study.

Acknowledgements

The author (s) declare that they have no competing interests.

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