

RESEARCH COMMUNICATION

Epidemiology of Esophageal Cancer in Kazakhstan

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Abstract

The incidence of esophageal cancer in Kazakhstan was analysed for the period of 1989-2010 years, with a focus on trends by age, gender and region. The highest rates of incidence were evident in the Western regions. The dynamics for cancer of the esophagus in the Republic demonstrated decrease, except in the Karaganda region, where a tendency for increase was noted. Considerable variation between regions pointed to differences in risk factor exposure which need to be targeted for future control efforts.

Keywords: Esophageal cancer - time trends - geographical variation - Kazakhstan

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Introduction

Esophageal cancer continues to be of global importance. In Globocan 2008 (Ferlay et al., 2010), it was found to be the eighth most common cancer worldwide, with 481,000 new cases, and the sixth most common cause of death from cancer with 406 000 deaths (5.4% of the total). More than 80% of the cases and deaths occur in developing countries and Central and East Asia have particularly high rates. However, the situation is changing over time. Although the situation is very complicated by increase in adenocarcinoma rates in the United States and Europe (Lagiou et al., 2008; Trivers et al., 2008), squamous cell carcinomas continue to greatly predominate in Asia.

Mortality or incidence has drastically decreased in China, Hong Kong, Japan, Korea and Singapore (Fernandes et al., 2006; Sun et al., 2007; Tse et al., 2007; He et al., 2008; Wei et al., 2011; Zhang et al., 2012). This appears to be the case in both rural and urban populations, as well as high risk areas in China (Guo and Huang, 2011; Wei et al., 2011). In contrast, rates appear to be increasing in Taiwan (Lu et al., 2010) and Viet Nam (Vuong et al., 2010). Although slight decrease has been noted in India (Yeole, 2008), in one study in Karachi, Pakistan, and another in Sri Lanka, no change was evident over time until 2004 (Bhurgri et al., 2004; Cherian et al., 2007). Also in Japan and Korea, the decrease has been relatively slight (Jung et al., 2010; Ito et al., 2011), a similar situation being reported in Iran (Yazdizadeh et al., 2005), although major decrease was apparent in the Turkmen plain, in the east (Semnani et al., 2006).

Esophageal cancer is a major cancer site in all of the central Asian republics (Akhtyamov, 1981; Moore et al., 2009; 2010; Ferlay et al., 2010). While reduction

has recently been noted for Kazakhstan (Igissinov et al., 2011) variation might be expected across regions in such a large country with two ethnic groups, Russian and Kazakh. Therefore, the present investigation of regional characteristics of esophageal cancer in Kazakhstan was performed.

Materials and Methods

Study material based on data of oncological institutions of the republic during 1989-2010 period, regarding esophageal cancer. According to generally accepted methods of medical-biological statistics were calculated extensive and intensive incidence of esophageal cancer in the dynamics and trends of incidence determined by the method of least squares.

Results

Extensive esophageal cancer rates by age groups (both sexes) of Kazakhstan, characterized with fact of high proportion of patients has been detected among those aged 50-59 years old (18.7%), 60-69 years (34.6%) and 70 years and older (33.0%). At the same time, the proportion of esophageal cancer among the male population of Kazakhstan by age groups was uneven and the highest percentage recorded among persons 60-69 years (34.7%), while among the women – aged 70 and older (42.5%). Thus, the generalized average proportion of patients with esophageal cancer among people in Kazakhstan (Figure 1) during 1989-2010 periods has shown that a high percentage of esophageal cancer for the whole population of the country is found among persons of 70 years and older, males 60-69 years (37.4%) and women aged 70

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years and older (40.5%).

Moreover, among men aged 50-59 years (25.9%) proportion of esophageal cancer was 1.8 times higher than data of similar age group among women (14.2%).

Intense esophageal cancer rates among residents of Kazakhstan (Figure 2) tended to decrease from 15.5⁰/₀₀₀₀ (1989) to 8.1⁰/₀₀₀₀ in 2010, the average rate was 11.3⁰/₀₀₀₀. At the same time the incidence of esophageal cancer in the republic decreased to 7.4⁰/₀₀₀₀ patients or 47.7%, the average annual rate of decline in the incidence of esophageal cancer was significant (T=-2.9%), and decrease of the incidence trend angle tg α is close to 30°, what indicating the true decline of this form of cancer on the territory of Kazakhstan. This fact may be due to social-economic status of the population, which has improved, and ecological situation in the country has changed in connection with the liquidation of the Semipalatinsk and Azgir nuclear test sites. There was also a change in dietary patterns – reduced the content of carcinogenic agents such as nitrosamine precursors (nitrites, nitrates and ammonia) and etc. In addition, changed the age composition of the population – reduced group of persons exposed to the products of nuclear explosions, which were conducted in Kazakhstan. These factors influenced the ranking distribution of esophageal cancer in different regions of the country (Figure 3).

Thus, the average annual incidence of esophageal cancer among the population of the Semipalatinsk region (before joining East Kazakhstan) was high (18.3⁰/₀₀₀₀), in comparison with republican data (11.3⁰/₀₀₀₀), and

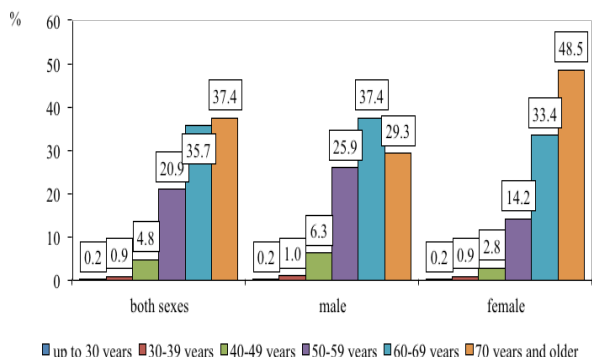


Figure 1. The Average Annual Proportion of Patients with Esophageal Cancer by Gender in Kazakhstan for 1989-2010 years

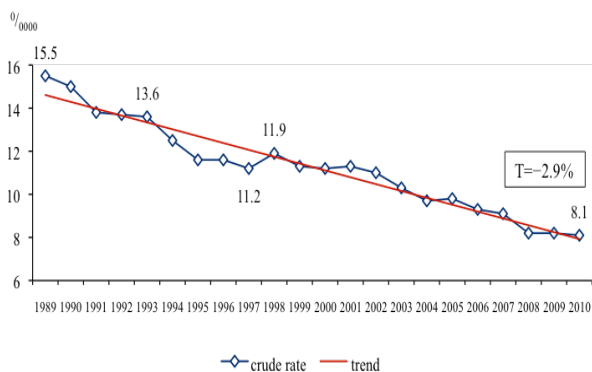


Figure 2. The Dynamics of Intense Rates of Esophageal Cancer Incidence in Kazakhstan for 1989-2010 years

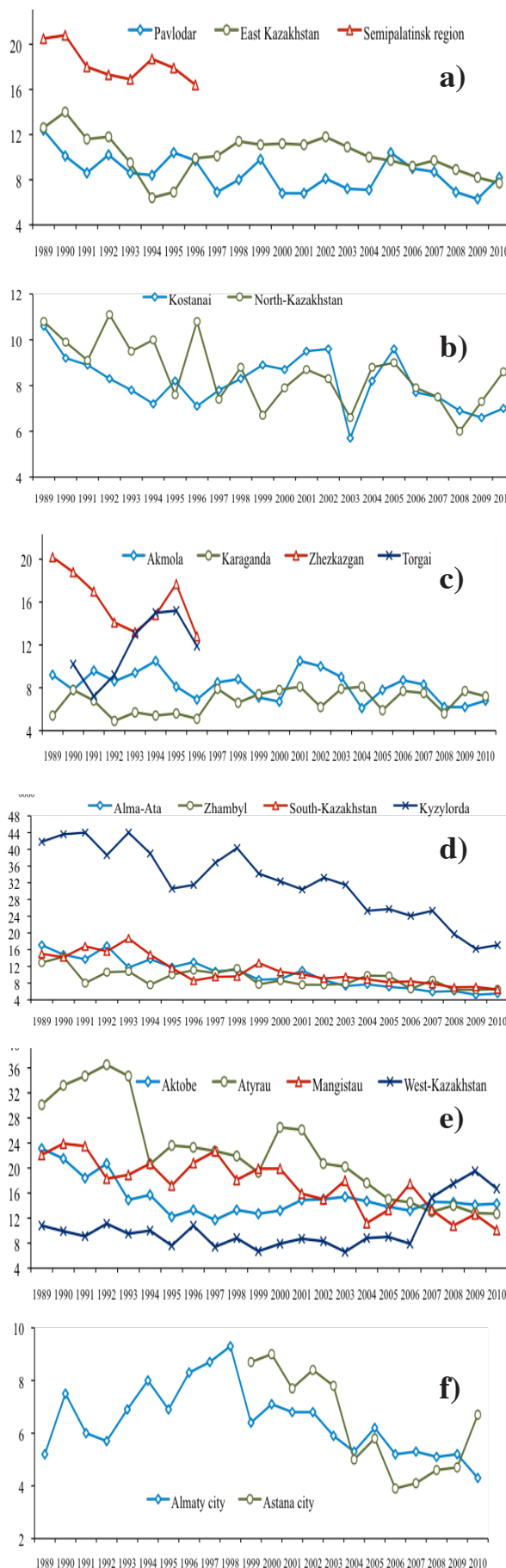


Figure 3. Incidence Rates for Esophageal Cancer in Regions of Kazakhstan over Time. a) Eastern 1989-2010; b) Northern 1989-2010; c) Central 1989-2010; d) Southern 1989-2010; e) Western 1989-2006; f) Major cities

decreased over in dynamics from 20.5 (1989) to 16.4⁰/₀₀₀₀ in 1996 (T=-2.7%). After joining to East Kazakhstan incidence rates turned lower, than in the country and have averaged 10.20/0000. The dynamics of intense incidence of esophageal cancer in East Kazakhstan decreased from 10.1 (1996) to 7.7⁰/₀₀₀₀ in 2010 (T=-1.2%). The average annual incidence of esophageal cancer among the population of Pavlodar region (8.6⁰/₀₀₀₀) also, was lower, than in the country and tended to decrease from 12.4 (1989) to 8.2⁰/₀₀₀₀ in 2010 (T=-1.5%). The sharp decline of esophageal cancer incidence in the Eastern regions of Kazakhstan after collapse of The Soviet Union is mainly due to migration, which took place in 1991-1995 periods.

In the northern regions of Kazakhstan the frequency of esophageal cancer in Kostanai (8.2⁰/₀₀₀₀) and North-Kazakhstan (8.6⁰/₀₀₀₀) areas was lower than in the country. In the dynamics the incidence of esophageal cancer in Kostanai region decreased from 10.6 (1989) to 7.0⁰/₀₀₀₀ in 2010 (T=-1.0%), as well as in North Kazakhstan – from 10.8 to 8.6⁰/₀₀₀₀, respectively (T=-1.6%). During the study period the incidence in this region remains relatively stable, with no greater rate of decline trends of morbidity, especially in the North-Kazakhstan region.

In Central region of Kazakhstan, the incidence rate of esophageal cancer was high only in Zhezkazgan region (16.1⁰/₀₀₀₀) before joining to the Karaganda region, where the average annual incidence was 6.7⁰/₀₀₀₀. In Akmola (8.2⁰/₀₀₀₀) and Torgai (11.7⁰/₀₀₀₀) regions the incidence of esophageal cancer as it was in other regions of Central area, was lower, than in the country. In the dynamics the esophageal cancer incidence tended to increase only in Karaganda region from 5.4 (1989) to 7.2⁰/₀₀₀₀ in 2010, and the growth rate was T=+1.1%. In Akmola region esophageal cancer decreased from 9.2 to 6.8⁰/₀₀₀₀ respectively, while the average annual rate of decline of incidence trends were T=-1.2%.

For the southern region of Kazakhstan, characteristic was the fact that in all areas esophageal cancer was higher than in the country. The highest incidence of esophageal cancer was established in the Kyzylorda region (32.1⁰/₀₀₀₀), what is three times higher than rates of esophageal cancer in the republic, and in the dynamics this index decreased (T=-3.9%) from 41.8⁰/₀₀₀₀ to 17.1⁰/₀₀₀₀ for 1989-2010 years.

In Zhambyl (9.1⁰/₀₀₀₀), Almaty (10.2⁰/₀₀₀₀) and South-Kazakhstan (10.9⁰/₀₀₀₀) regions the frequency of esophageal cancer has been relatively the same, but also higher than in the country. Trends of incidence in all areas of the southern region of Kazakhstan had a tendency to decrease. The highest rate of decline was found in Zhambyl (T=-2.6%), Kyzylorda (T=-3.9%), South-Kazakhstan (T=-4.5%) and Almaty (T=-5.7%) regions.

In West Kazakhstan region, the lowest incidence of esophageal cancer is established in West-Kazakhstan – 10.4⁰/₀₀₀₀ (T=+2.6%) region, and the rest – in Aktobe 15.2⁰/₀₀₀₀, Mangistau – 17.4⁰/₀₀₀₀ and Atyrau – 22.4⁰/₀₀₀₀ regions these rates were higher than those in the country. The highest incidence of esophageal cancer was detected in the Atyrau region, where the frequency of cancer was 2 times higher in comparison with data of Kazakhstan.

Trends of esophageal cancer incidence decreased,

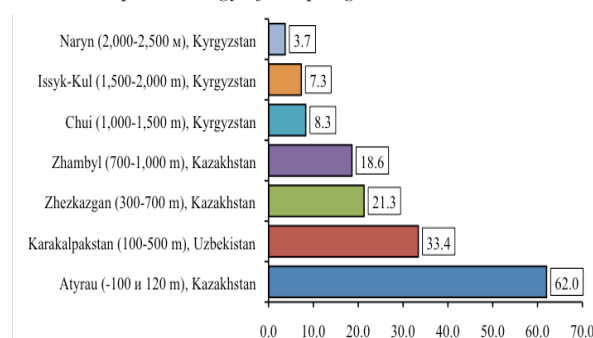


Figure 4. Esophageal Cancer in Different Regions, Depending the Height Above Sea Level 1979-1981 years

and highest rates of decline were established in Atyrau (T=-5.0%), Mangistau (T=-3.2%), Aktobe (T=-1.7%) regions. These areas are mainly located in the Caspian lowlands, the level of the territory lies below 100 and 120 m above sea level. A comparison of rates with reference to altitude is given in Figure 4.

Cancer of esophagus in the major cities of Kazakhstan, such as Almaty (6.5⁰/₀₀₀₀) and Astana (6.4⁰/₀₀₀₀), was almost 2 times lower than in the country. It was established that below the average for the national average data (11.3⁰/₀₀₀₀), were 10 regions and 2 cities with a frequency of esophageal cancer from 6.4 to 10.9⁰/₀₀₀₀, above the national average – 7 regions with incidence of esophageal cancer from 11.7 to 32.10/0000. And the first place has Kyzylorda (32.1⁰/₀₀₀₀), second – Atyrau (22.4⁰/₀₀₀₀) and third – Mangistau (17.4⁰/₀₀₀₀) regions.

Discussion

The identified regional features of distribution of esophageal cancer in the territories of Kazakhstan, allows to define priority on the issue and to organize focused anti-cancer actions in some regions. The variation observed clearly points to differences in exposure to risk factors.

Smoking is an independent risk factor for esophageal lesions and significantly associated with chronic esophagitis (Zaridze et al., 1985; Zaridze et al., 1987; Evstifeeva and Zaridze, 1992). Alcohol intake was not found to be independently associated with the presence of oral and oesophageal precancerous lesions (Evstifeeva and Zaridze, 1992). Differential evaluation of different pathologies of the esophageal mucosa suggested a link between catarrhal and erosive esophagitis and vitamin B2 deficiency and atrophic esophagitis and vitamin A deficit (Zaridze et al., 1989). Polycyclic aromatic hydrocarbons might also contribute to the high risk.

Regarding traditional analytical epidemiology one group have evaluated variation between plain (Kyzyl-Orda Region) and mountainous (Alma-Ata Region) areas, finding an inverse association with altitude for this cancer (Akhtiamov and Kairakbaev, 1983). There are much higher rates in Kyrgyz than in Russians in Kyrgyzstan, again with an altitude link (Igisinov et al., 2002).

Control of esophageal cancer has long been a top priority in Kazakhstan (Sharmanov et al., 1996). Future research should focus on identifying the risk factors which can be targeted on a regional basis.

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