RESEARCH COMMUNICATION

Age Characteristics of Incidences of Prevalent Cancers in the Aral Sea Area of Kazakhstan

Nurbek Igissinov[1,2]*, **Dmitriy Tereshkevich**[2], **Malcolm A Moore**[3], **Saginbek Igissinov**[1,4], **Mazhit Shaidarov**[2], **Zarina Bilyalova**[1,2], **Gulnur Igissinova**[1,5], **Indira Nuralina**[2], **Saken Kozhakhmetov**[2], **Dana Mauyenova**[2]

Abstract

The aim of the research was to examine age-specific features of incidence of cancer of the esophagus, lung, stomach, breast, cervix and thyroid gland in the Aral Sea area in Kazakhstan. A retrospective study of 11 years (1999-2009) was conducted using descriptive and analytical methods with calculated age incidence rates. The average age of patients with esophageal cancer and lung cancer had a tendency for increase with "aging", while in other cases "juvenation" was noted. The peak incidence of malignant tumors in general, and in the studied forms of cancer was found at 70 years of age or older, except for breast cancer and cervical cancer, where the peak incidence was found at 60-69 years. Trends in age-varied incidence rates had different tendencies in particular organ sites.

Keywords: Prevalent cancers - incidence rates - age - sex - Aral Sea, Kazakhstan

Introduction

For the recent years an increase of incidence rates at all age groups has been detected, both men and women, but the largest growth of this indicator is been observed at the 60 years age group and older. At the same time an epidemiological study of cancer shows uneven distribution of it in the world. Numerous epidemiological and clinical studies have accumulated a lot of data on the connection between cancer evolution with a variety of endogenous causes and exogenous environmental factors, that influence on risk of disease evolution (Berrino et al., 1995; Gazelle et al., 1995; Chissov et al., 2002; Antunes 2003; Boyle et 2003; Parkin et al., 2005; IARC, 2003, 2010; Ferlay et al., 2007; American Cancer Society, 2009; MEPs against cancer, 2011; WHO, 2011).

Risk of evolution the oncological disease can be caused by many different factors. All risk factors of malignant tumors can be divided into internal (genetic) and external. These factors influence into diseases evolution in isolation or combined. The beginnings and spread of cancer directly related to the age composition of the population, because one of the most significant risk factor is age. Age is a variable, which role should be considered in all epidemiological studies, as the state of health, perhaps more than in other characteristics associated with age. This is especially important for epidemiological studies of malignant tumors. In connection with this very important direction to understand the causes of cancer is studying the characteristics of their distribution in certain medical-geographic regions among different age groups of the population. These studies are helping in finding new methods of personal and social prevention of malignant tumors and are required for proper and targeting cancer control among the population. As life itself puts large-scale experiment by creating for human different climatic-geographical, life and industrial conditions, which are more or less influence on his body. Consequently, on the basis of this concept these factors are subject to the special studying order to explain prevailing rate of some forms of cancer in one groups and an extreme rarity in others. Trends in the incidence of malignant neoplasms in different age groups allow us to estimate and characterize the overall trend of growth or decline of the incidence of certain medical and geographic regions.

Thus, the purpose of this study was to evaluate the incidence in different age groups with some forms of cancer in the Kazakh part of the Aral Sea.

Materials and Methods

The sources of research were recording and reporting documents of the Kazakh Research institute of Oncology and Radiology, Kyzylorda Regional oncological center on patients with first-ever diagnosed with cancer. Were investigated following localizations of cancer: esophagus,

*[1]Central Asia Cancer Institute, [2]Astana Medical University, [3]UICC Asian Regional Office for Cancer Control, [4]S.D. Asfendiyarov Kazakh National Medical University, Astana, [5]Kazakh Research Institute of Oncology and Radiology, Almaty, Kazakhstan *For correspondence: nurbek_igissinov@mail.ru, n.igissinov@gmail.com*

lung, stomach, breast, cervix and thyroid gland. Was used database "Cancer Registry". The research period amounted 11 years (1999-2009). Data on the population were taken from the Agency of statistics of the Republic of Kazakhstan from 1999 to 2009 (Demography Yearbook of Kazakhstan regions, 2007, 2010).

By conventional methods of sanitary statistics (Merkov et al., 1974; Glantz, 1999) calculated the extensive, age and aligned rates , the average values (M), mean age, mean error (m), 95% confidence interval (CI). The dynamics of incidence was studied for 11 years, where incidence trends were determined by the method of least squares. To calculate the average annual growth rate and/or decrease the time series used the geometric mean. Incidence rates of breast cancer and cervical cancer were calculated per 100,000 female population, and the incidence of other forms of cancer is calculated among 100,000 population. We used the program BIOSTAT for Windows (Version 4.03 by Stanton Glantz) and Microsoft Excel 2010.

Results and Discussion

The average age of patients with malignant tumors as a whole amounted 53.7 ± 2.7 years ($95\%°CI=48.4-59.0$ years). In the dynamics aligned average age decreased from 56.8 years (1999) to 50.5 years in 2009, and the average annual rate of decline was $T=-1.2\%$, that is to say that there is a tendency of cancer "rejuvenation". Analysis of the average annual age incidence rates of malignant neoplasms in general in Kyzyl-Orda region of Kazakhstan has shown that the peak incidence happens to the age group 70 years and over – $1,628.7 \pm 54.0$ ($95\%°CI=1,522.9-1,734.5$).But for all that $95\%°CI$ do not overlap to one another, that is to say differences were statistically significant ($p<0.05$) and to the figures objectively influenced various factors. In the dynamics the age-aligned indexes tended to increase only in 30-39 and 40-49 years, average annual compounded rate were $T=+1.2\%$ and $T=+0.02\%$, respectively. In other age groups there was a decline and the most pronounced trends were in the 50-59 years ($T=-2.5\%$). Next, consider the age-incidence of the region population on the leading forms of cancer (see Table 1).

Cancer of esophagus

The average age of patients with esophageal cancer was 71.3 ± 0.4 years ($95\%°CI=70.6-72.0$ year) and in the dynamics trend of aging was observed ($T=+0.1\%$). The incidence of esophageal cancer was also high in 70 years and older – 492.1 ± 34.0 ($95\%°CI=425.4-558.8$).In dynamics the incidence of esophageal cancer decreased across all age groups, but the most marked reduction trend observed up to 30 years ($T=-10.4\%$) and 50-59 ($T=-14.8\%$). Between age indicators was established a statistically significant difference ($p<0.05$), as their 95% CI did not overlap to each other.

Lung cancer

The average age of patients with lung cancer totaled 65.4 ± 0.3 year ($95\%°CI=70.6-72.0$ year) and in the dynamics the aligned index remained practically

Table 1. Average Annual Age-related Incidence Rates in the Aral Sea area of Kazakhstan for 1999-2009

Age group	Mean±SD	95% CI	T (%)
All cancers			
< 30	15.5±0.8	13.9-17.0	–0.6
30-39	62.5±2.6	57.5-67.5	+1.2
40-49	172.7±6.2	160.5-184.9	+0.02
50-59	469.2±17.7	434.5-504.0	–2.5
60-69	1,059.8±27.9	1,005.1-1,114.5	–1.5
≥ 70	1,628.7±54.0	1,522.9-1,734.5	–2.2
Oesophageal			
< 30	0.1±0.08	0-0.28	–10.4
30-39	1.0±0.2	0.5-1.4	–5.0
40-49	11.2±1.3	8.7-13.8	–5.1
50-59	59.0±9.0	41.2-76.7	–14.8
60-69	242.5±17.6	208.0-277.0	–5.7
≥ 70	492.1±34.0	425.4-558.8	–5.8
Lung			
<0	0.3±0.08	0.12-0.42	–2.8
30-39	3.2±1.0	1.2-5.2	+2.0
40-49	16.1±1.2	13.7-18.5	–1.2
50-59	68.2±4.0	60.4-76.0	–2.0
60-69	164.9±13.3	138.8-191.1	–2.1
≥ 70	229.4±17.3	195.5-263.3	+1.0
Stomach			
< 30	0.2±0.06	0.09-0.34	–44.0
30-39	4.2±0.7	2.9-5.6	–1.0
40-49	16.8±1.6	13.7-20.0	–6.1
50-59	53.5±3.0	47.7-59.4	–1.2
60-69	164.3±9.2	146.3-182.3	–0.1
≥ 70	256.3±21.6	213.9-298.6	–4.3
Breast			
< 30	0.5±0.18	0.14-0.85	+16.8
30-39	18.8±1.8	15.3-22.3	+5.9
40-49	51.4±4.1	43.4-59.4	+3.5
50-59	67.5±5.4	57.0-78.0	+4.6
60-69	69.4±7.2	55.2-83.5	+8.3
≥ 70	67.2±7.0	53.4-81.0	+3.3
Cervical			
< 30	0.7±0.18	0.40-1.10	–3.3
30-39	14.2±2.3	9.7-18.6	+0.4
40-49	23.5±2.8	17.9-29.0	+8.5
50-59	30.7±3.1	24.7-36.7	+0.3
60-69	41.6±7.8	26.3-56.9	–1.1
≥ 70	39.5±6.4	26.9-52.2	+0.4
Thyroid			
< 30	0.3±0.06	0.17-0.41	+7.2
30-39	1.3±0.5	0.2-2.3	+11.7
40-49	1.9±0.5	1.0-2.9	+14.4
50-59	6.9±1.6	3.8-10.0	+3.6
60-69	7.6±2.6	2.6-12.7	+6.0
≥ 70	9.5±2.7	4.2-14.9	–3.6

100.0

75.0

50.0

25.0

0

6.3

56.3

31.3

Newly diagnosed without treatment

unchanged ($T=+0.03\%$). The incidence of lung cancer was set in the older age group – 70 years and older – $229.4 \pm 17.30/0000$ ($95\%°CI=195.5-263.3$). In the dynamics incidence of lung cancer increased in 30-39 years ($T=+2.0\%$) and 70 years and older ($T=+1.0\%$), while in other age groups there was a decrease 95% CI of age indicators do not overlapped , it means that differences were statistically significant ($p<0.05$).

Stomach cancer

The average age of patients with gastric cancer totaled 66.3 ± 0.4 year ($95\%°CI =65.6-67.0$ year) and in

dynamics observed insignificant tendency to "rejuvenate" (T=–0.2%).High incidence of gastric cancer was revealed at age of 70 years and older 256.3±21.6 (95%°CI=213.9-298.6). In the dynamics of indicators of all age groups declined, but the most pronounced trend is found up to 30 years and older (T=–44.0%). The differences between age indicators were statistically significant (p<0.05).

Breast cancer

The average age of women with breast cancer totaled 53.5±0.6 year (95%°CI=52.3-54.7 year) and trends of alignment indicators in the dynamics declined (T=–0.1%), i. e. tended to be "rejuvenation". The peak incidence of breast cancer among the female population of the region has been identified in 60-69 years – 69.4±7.2(95%°CI=55.2-83.5). Analysis of 95% CI shows, that they are under 40 years does not overlap i.e. differences were statistically significant (p<0.05). In the other age groups, 95% CI overlapped and the differences were not significant and to morbidity effects the same risk factors. In the dynamics the age-related trends in the indicators tended to increase, while the highest rate was identified in the age group under 30 years (T=+16.8%).

Cancer of the cervix

The average age of patients with cervical cancer amounted 52.4±1.0 year (95%°CI=50.6-54.3 years) and in the dynamics the trends of indicators are been declined (T=–0.3%). The average annual incidence of cervical cancer among the female population was the highest in 60-69 years – 41.6±7.8 (95%°CI=26.3-56.9) (Table 6). In the dynamics the age-based aligned indicators had a different trend. Reduction established in the age groups up to 30 years (T=–3.3%) and 60-69 years (T=–1.1%). High trend of growth has been detected in 40-49 years (T=+8.5%). Analysis of the 95% CI, age indicators set, the differences were statistically significant, where they don't overlap.

Thyroid cancer

The average age of patients with gastric cancer amounted 53.7±2.7 years (95%°CI=48.4-59.0 years) and in the dynamics observed the tendency toward rejuvenation (T=–1.2%). The peak incidence of thyroid cancer has installed 70 years and older – 9.5±2.7 (95%°CI=4.2-14.9). In the dynamics trends of incidence rates at all ages tended to increase, with an exception of 70 years and older (T=–3.6%). The average age of malignant tumors patients in general amounted 53.7 years, and this figure was the lowest for cervical cancer (52.4 years) and was the highest for cancer of the esophagus (71.3 years). In the dynamics practically all the studied forms of cancer tended to "rejuvenate", except for esophageal and lung cancer.

Overall

Analysis of age-related morbidity of malignant tumors in general in the Aral sea region of Kazakhstan had showed that the peak incidence was is in the age group 70 years and older – 1, 628.7±54.0. A similar pattern was observed in almost all studied forms of cancer, except breast and cervical cancer, where the peak incidence is set on 60-69 years.

The dynamics of trends in age-aligned rates has a different tendency. Thus, the highest annual average of decline in alignment indicators are set for esophageal cancer in the 50-59 years age group (T=–14.8%), gastric cancer to 30 years (T=–44.0%), cervical cancer up to 30 years (T=–3.3%) and thyroid cancer at age 70 and older (T=–3.6%). The high growth trends for lung cancer identified in 30-39 years (T=+2.0%), breast cancer (T=+16.8%), cervical cancer (T=+8.5%) and thyroid cancer (T=+14.4%). It also should be noted that in cancer of esophagus and stomach cancer all age-aligned rates were tended to decrease and the breast cancer trends in age-related indicators are rising.

Thus, the identified age-related features of morbidity studied forms of cancer at the Kazakh part of the Aral Sea (Kyzylorda region) will help to local health authorities in the organization of targeted anti-cancer activities and to develop ways of primary prevention and screening programs.

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