RESEARCH ARTICLE

Spatial and Temporal Epidemiological Assessment of Breast Cancer Incidence and Mortality in Kazakhstan, 1999-2013

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Abstract

Breast cancer incidence and mortality in Kazakhstan are considered to be increasing but exact statistics have hitherto been lacking. The present study was therefore undertaken to retrospectively assess data for the whole country, accessed from the central registration office, for the period 1999-2013. Age standardized data for incidence and mortality were generated and compared across age groups. It was determined that during the studied period 45,891 new cases of breast cancer were registered and 20,122 women died of this pathology. Average breast cancer incidence and mortality were 37.9±1.10/10^5 and 16.7±0.20/10^5 respectively, and the overall ratio of mortality/incidence (M/I) was 0.44. Incidence tended to increase (T = + 2.3%), and mortality to decrease (T of =–0.3%). Peaks of incidence and mortality were noted in those aged 60-74 years and 75-84, respectively. Particularly high incidences were established in large cities of Kazakhstan, Astana (46.8±1.80/10^5) and Almaty (49.7±1.30/10^5), and high mortality was observed in the Pavlodar region (17.9±0.60/10^5) and Almaty city (20.1±0.40/10^5). Considerable variation in the mortality/incidence ratio was noted, suggesting the need for more stress on access to screening and clinical care in some regions of the country.

Keywords: Breast cancer - incidence - mortality - trends - age dependence - geographical variation - Kazakhstan

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Introduction

Breast cancer is of great importance throughout Asia (Ferlay et al., 2013) including Central Asia, the incidence rate for example being recently found to be increasing in Kazakhstan (Bilyalova et al., 2011; Igissinov et al., 2011; 2012). Reported risk factors in the country include unfavorable living conditions, chronic stress, unilateral breastfeeding, breastfeeding less than 3 months and over 2 years, abortions, and hereditary predisposition (Toleutay et al., 2013). In addition, a direct strong correlation between the degree of contamination with high pollution emissions in the atmosphere from stationary sources and the incidence of breast cancer has been described (Bilyalova et al., 2012). The situation in Central Asia may be complicated by higher rates in Russians than Turkic inhabitants (Igisinov et al., 2005).

Studying breast cancer epidemiology is of great interest with regard to geographical variation across the globe and trends over time in difference age groups. In the majority of countries of Asia increase in breast cancer incidence and morbidity is being observed, and growth among the population with initially low indicators of morbidity, as for example, in Japan and other countries of East Asia.

Since very liimited information is available in the international literature regarding breast cancer statistics in Kazakhstan, the present descriptive study was performed to provide baseline data for more analytical analyses in the future. Kazakhstan as a region located in various geographical conditions with various social-demographic and climatic-geographical features can be accepted as geographical model for epidemiological research. The purpose of this research was to estimate spatial and temporal epidemiological features of breast cancer incidence in Kazakhstan over the last decades.

Materials and Methods

The main sources of information when performing this research were materials of the state registration about breast cancer patients. The research sources were registration and reporting documents of oncological establishments of the republic about patients who for the first time in their lives were diagnosed to have breast cancer. The studied period was 15 years (1999-2013). Data of Committee statistics of the Ministry of national economy of the Republic of Kazakhstan on the number of the female population of areas and the republic in general were used in the work. Materials were collected and analysed on administrative-territorial division (14 areas and 2 cities: Astana and Almaty).

Retrospective research with application of descriptive and analytical methods of epidemiology was used as the

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Table 1. Incidence and Mortality Data for Kazakhstan, 1999-2013, According to Age Group

Age	Incidence			Mortality			M/I
	Number (%)	Rate/100,000 P±m	T, %	Number (%)	Rate/100,000 P±m	T, %	
< 25	114 (0.2)	0.23±0.02	–1.3	16 (0.1)	0.03±0.01	–10.1	0.14
25-29	324 (0.7)	3.3±0.3	+2.7	76 (0.4)	0.80±0.12	–5.1	0.24
30-34	1,021 (2.2)	11.5±0.4	+1.4	300 (1.5)	3.4±0.2	–1.9	0.30
35-39	2,260 (4.9)	26.2±0.7	+1.2	672 (3.3)	7.8±0.4	–2.1	0.30
40-44	4,414 (9.6)	52.1±1.4	–0.5	1,370 (6.8)	16.2±0.7	–3.1	0.31
45-49	6,613 (14.4)	83.5±1.8	–0.5	2,292 (11.4)	29.2±1.3	–3.5	0.35
50-54	7,002 (15.3)	105.0±2.3	+0.9	2,798 (13.9)	42.9±1.4	–2.2	0.41
55-59	6,011 (13.1)	118.5±5.9	+3.7	2,604 (12.9)	52.6±1.2	+0.4	0.44
60-64	5,415 (11.8)	125.8±8.2	+4.7	2,498 (12.4)	57.8±2.4	+1.6	0.46
65-69	4,421 (9.6)	124.5±6.6	+2.7	2,205 (11.0)	61.1±2.0	–0.7	0.49
70-74	4,079 (8.9)	126.1±4.7	+2.5	2,230 (11.1)	69.1±2.2	+0.6	0.55
75-79	2,448 (5.3)	117.2±4.6	+1.3	1,648 (8.2)	78.8±2.2	–0.5	0.67
80-84	1,203 (2.6)	101.2±4.1	+1.7	917 (4.6)	78.7±3.5	–0.9	0.78
85 +	566 (1.2)	83.2±5.1	+3.6	493 (2.5)	73.0±3.7	+1.1	0.88
Total	45,891 (100)	37.9±1.1	+2.3	20,122 (100)	16.7±0.2	–0.3	0.44

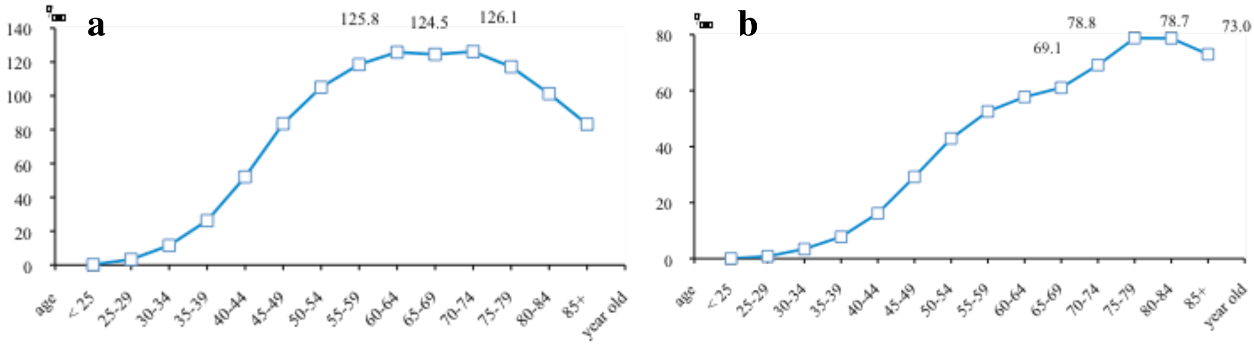

Figure 1. Age Distribution of Breast Cancer a) Incidence and b) Mortality in Kazakhstan, 1999-2013.

main method when studying breast cancer incidence. Extensive, rough and standardized indicators of incidence are determined by standard technique applied in medicobiological statistics. Standardized indicator was calculated by a direct method, thus the standard of world age structure of the population was used.

Dynamics of breast cancer incidence indicators have been studied for 15 years, thus morbidity trends were determined by method of the smallest squares. The average geometrical was applied to calculate average annual rates of increase/decrease. Age standardized incidence indicators were used when drawing up cartograms. The way of drawing up a cartogram was after Igisinov in (1974), based on determining an average square deviation (σ) from an average (x) .

Results

During 15 years (1999-2013) 45,891 cases of breast cancer incidence were registered in Kazakhstan and 20,112 women died of this pathology. Age groups distribution on number of breast cancer patients showed that groups in the age range from 45 to 65 were the most numerous – 25,041 (54.6%) sick 54.6% (Table 1). Average breast cancer incidence and mortality were 37.9±1.10/10^5 and 16.7±0.20/0^5 respectively, and the overall ratio of mortality/incidence (M/I) was 0.44. Incidence tended to increase (T = + 2.3%), and mortality to decrease (T of =–0.3%). Peaks of incidence and mortality were noted in those aged 60-74 years and 75-84, respectively.

An average annual middle age of breast cancer patients

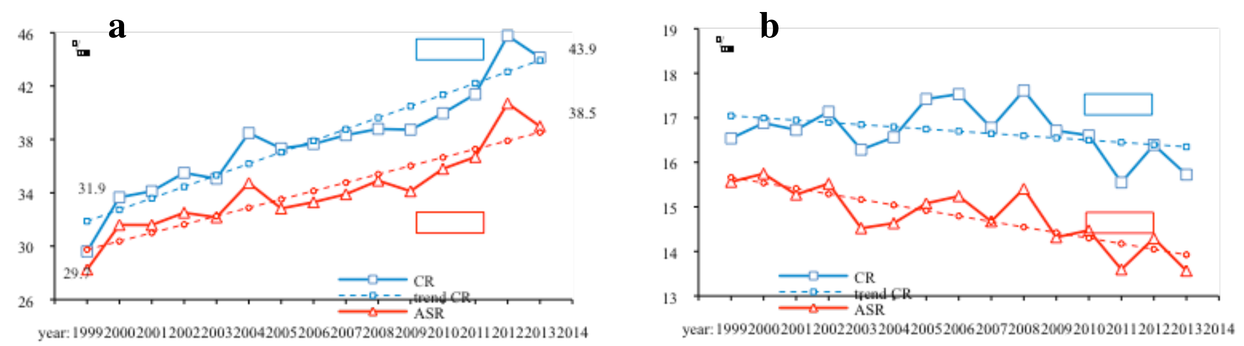

Figure 2. Dynamics of Breast Cancer a) Incidence and b) Mortality in Kazakhstan, 1999-2013.

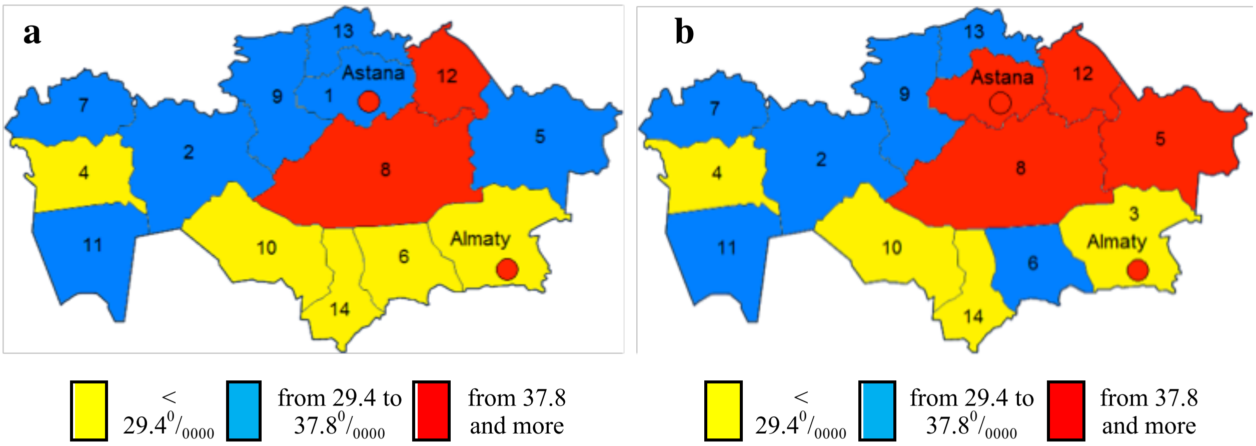

Figure 3. Cartograms of Breast Cancer a) Incidence and b) Mortality in Kazakhstan in 1999-2013. Areas: 1. Akmolinsk, 2. Aktyubinsk, 3. Almaty, 4. Atyrau, 5. East Kazakhstan, 6. Zhambyl, 7. West Kazakhstan, 8. Karaganda, 9. Kostanay, 10. Kyzylorda, 11. Mangystau, 12. Pavlodar, 13. North Kazakhstan, 14. Southern Kazakhstan (after Igissinov, 1974)

Table 2. Breast Cancer by Regions

Oblast/City	Incidence 0/0000	T, %	Mortality 0/0000	T, %	M/I
South K	23.4±0.7	+1.7	10.0±0.5	+1.1	0.43
Kyzylorda	23.7±1.1	+3.5	10.4±0.6	+1.5	0.44
Atyrau	24.1±1.4	+3.7	10.8±0.6	+2.7	0.45
Almaty	24.6±1.3	+0.9	11.8±0.4	−1.5	0.48
Zhambyl	25.4±1.1	+1.8	13.7±0.5	+1.0	0.54
Mangystau	30.7±1.6	−1.0	13.4±1.0	−1.4	0.44
Aktyubinsk	31.8±1.2	+2.4	13.9±0.5	−0.5	0.44
Kostanay	33.3±1.7	+3.2	14.5±0.5	−0.8	0.44
West K	33.6±1.4	+2.6	14.4±0.5	−1.0	0.43
Akmolinsk	34.0±1.0	+1.0	15.9±0.4	−1.1	0.47
North K	36.6±1.8	+3.1	15.0±0.8	−2.5	0.41
East K	36.9±1.2	+2.0	15.9±0.3	+0.1	0.43
Karaganda	38.8±1.2	+1.8	16.8±0.6	−2.6	0.43
Pavlodar	44.3±1.3	+1.7	17.9±0.6	−0.2	0.41
Astana city	46.8±1.8	+1.6	15.9±1.0	−0.7	0.34
Almaty city	49.7±1.3	+1.8	20.1±0.4	−1.1	0.41
The Republic of Kazakhstan	34.1±0.8	+1.9	14.8±0.2	−0.8	0.43

for 1999-2013 made 56.5±0.1 years (95% CI=56.2-56.8 years), and in dynamics tended to increase from 55.5±0.3 years (95% CI=54.9-56.0 years) in 1999 to 57.0±0.2 years (95% CI=56.6-57.4 years), and an average annual rate of a leveled indicator growth made – T = + 0.2% (see Figure 2).

Average age indicators of mortality from breast cancer in dynamics (shown in Figure 1) statistically and significantly ($p<0.05$) grew from 58.5±0.4 years (95% CI=57.8-59.3 years) in 1999 till 60.7±0.4 years (95% CI=60,0-61,4 years), and average annual rate of growth made T = + 0.2 and 95% CI and in compared years weren't imposed at each other. During the studied years an average age of the dead made 59.9±0.2 years (95% CI=59,6-60,3years).

Particularly high incidences were established in large cities of Kazakhstan, Astana (46.8±1.80/10^5) and Almaty (49.7±1.30/10^5) (Table 2), and high mortality was observed in Pavlodar region (17.9±0.60/10^5) and Almaty city (20.1±0.40/10^5) (Figure 3). Considerable variation in the M/I was evident, from a low of 0.34 in Astana to a high of 0.54 in Zhambyl, perhaps reflecting ease of access to treatment or perhaps screening efforts.

Discussion

The present study revealed that whereas incidence rates of breast cancer are generally increasing in Kazakhstan, rates for mortality are generally reducing. This is basically in line with the literature for Central and East Asia (Long et al., 2010; Moore et al., 2010)Whether any increase might be retlated to screening efforts as reported by Beckmann et al (2015) for Australia needs to be ascertained (Beysebayev et al., 2015). Clearly in the future, there should be attention paid to differences between screened and non-screened regarding staging of lesions and mortality or survival. Incidence rates are known to be generally higher in cities than villages, for example in China (Wu et al., 2014). It is well known that ethnicity can affect breast cancer knowledge and compliance with screening recommendations in Kazakhstan (Chukmaitov et al., 2008) and rates of breast cancer for example in Kyrgystan between Russian and Turkic peoples (Igisinov et al., 2005). Whether there might be any correlate between rates of cancer positives and screenees by geographical location in Kazakhstan should also be assessed, taking into consideration the findings of Bilyalova et al. (2012).

It was established that breast cancer in young Nepalese women represents over one quarter of all female breast cancers, many being diagnosed at an advanced stage (Thapa et al., 2013). The analysis of cancer trends in Japan revealed a recent decrease in mortality and a continuous increase in incidence (Katanoda et al.,2013). The study of Afsharfard et al. (2013) that more aggressive disease for younger age groups, earlier peak incidence age and high rate of advanced BC at the time of diagnosis among Iranian women, were main findings. The increase of female breast cancer incidence rate in Beijing is positively correlated with the socioeconomic status, especially with the food expenditure level of Beijing residents over the last 10 years, the higher the economic development, the peak age of onset of female breast cancer is more postponed (Yang et al., 2014).

In conclusion, our data provide an initial survey of breast cancer statistics in Kazakhstan, a Central Asia country with great geographical and ethnic variation. Hopefully future work will provide a clearer picture of the efficacy of treatment, with possible attention to high risk groups and different target ages.

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