Cancer mortality in Inner Mongolia of China, 2008-2010

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ABSTRACT

Objective: The aim of our study was to determine the status of the common cancer in Inner Mongolia of China. Methods: We obtained data from the Centers for Disease Control in the Inner Mongolia from five monitoring points of DRS in Inner Mongolia from 2008 to 2010. We calculated the crude mortality, the proportion of all cause of death during the three years, further calculated cancer mortality, the proportion of cancer death and PYLL by genders. Results: During the period 2008-2010, the crude mortality of all cause of death is 518.02 per million in Inner Mongolia. As the second most common cause of death, the mortality dying from cancer is 127.11 per million, accounting for over one fifth of all deaths. Among all deaths from cancer, the lung cancer had the highest mortality rates (46.25 per million in males and 17.95 per million in females) and PYLL (0.72 in males and 0.41 in females), followed by the liver cancer (23.76 per million) and the gastric cancer (16.15 per million). The female breast cancer is the fourth leading cancer from mortality and PYLL for 7.65 per million and 0.17. Conclusion: Our analysis determined the severity of cancer death in Inner Mongolia of China from 2008 to 2010.Our study found that the cancer mortality in Inner Mongolia is lower than Chinese average level and most west countries, higher than some Africa countries. Our results will guide future cancer control strategies in Inner Mongolia of China.

KEYWORDS

1. INTRODUCTION

Malignant neoplasm (Cancer) is a social and public health issue in many regions worldwide, accounting for over 7.6 million cancer deaths occurred in 2008 [1]. Although the mortality rates from all types of cancer for males and females have declined slightly in most countries [2], a quarter of deaths are caused by cancer recently [3,4].

Several studies have been carried out about cancer statistics in the worldwide [1,3,4]. A number of reports from worldwide have shown that cancer plays an important role among all leading causes of death [5,6]. Such studies are of considerable importance in helping to better allocate resources towards the prevention and treatment of cancer [7]. Striking differences in the patterns of cancer from region to region are observed [1]. It is necessary to present the status of cancer in Inner Mongolia of China because of the lack of relevant reports.

Systematic cancer statistics could not only provide the data of cancer death, but also form the basis of cancer prevention and control. Thus, cancer mortality data in our study can be used to monitor and evaluate the cancer status of the Inner Mongolia of China.

Our study was designed to determine the common cancers of death for the Inner Mongolia. We will illustrate the severity of the common cancers in mortality rate, with special focus on the cancer population characteristic in Inner Mongolia, to provide a reference for relevant research. Our epidemiological analyses will help promote understanding of cancer status, guide future cancer control strategies in Inner Mongolia of China.

2. MATERIALS AND METHODS

2.1. Data Source

We obtained data from 2008-2010 based on International Classification of Diseases, Tenth Revision (ICD-10) codes for each of the cancers from the Centers for Disease Control in the Inner Mongolia. It collects data from five monitoring points of DRS in Inner Mongolia, and included Kailu County, Bairin Youqi, Sonid Youqi, Mus-

lims District and Linhe District. We selected three variables for sequentially analysis, that is, period of death, gender and cause of death.

2.2. Statistical Analysis

There were 15,098 deaths of male and 8291 deaths of female in five monitoring points, in the period 2008-2010. We analysis the crude mortality of males and females for three years and five monitoring points, the overall male-female ratio was calculated from mortality rates, next analysis the proportion of cause of death by gender. The proportion from common cancer of males and females were computed and plotted on a graph, the mortality and PYLL also were calculated. χ^2 test was used to compare the mortality rates between males and females for all the three studied years. Statistical significance was assessed for $p < 0.05$. Statistical analyses were performed with SPSS for Windows 13.0 software.

The contribution of common cancer to the overall change in life expectancy was calculated using cause elimination life tables in the abridged form with ages grouped into 5-year intervals, except the first 5 years [8]. All analyses were carried out separately for males and females.

3. RESULT

During the period 2008-2010, the crude mortality of all cause of death is 518.02 per million. **Figure 1** shows that for crude mortality rate by genders, male is steadily higher than female from 2008 to 2010, the ratio of male-female is 1.77.

Figure 2 shows the proportion of causes of death by genders in five monitoring points in Inner Mongolia from 2008 to 2010. When the proportion of cause of death was assessed, the disease of the circulatory system was listed as the first in terms of the proportion of cause of death for males and females, responsible for the approach half and surpass half of the proportion, followed by the Neoplasm. External causes of morbidity and mortality rank as the third leading cause of death for males
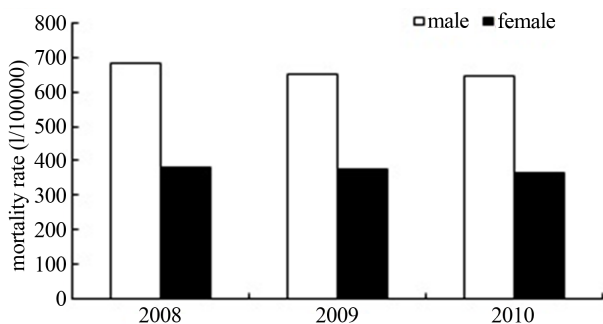

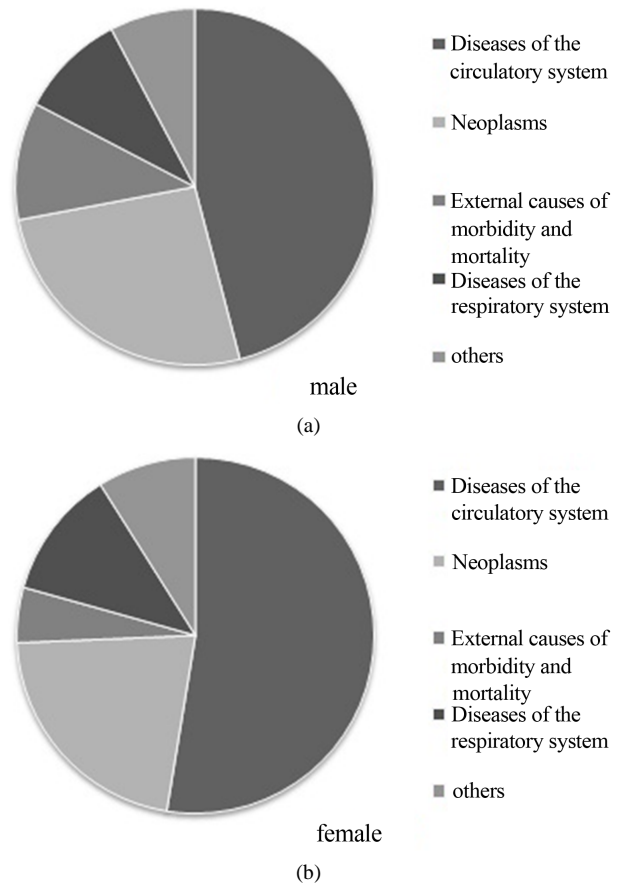**Figure 1.** Crude mortality in five monitoring points in Inner Mongolia, 2008-2010.

Figure 2. (a) Proportion of causes of death of male in five monitoring points in Inner Mongolia, 2008-2010; (b) Proportion of causes of death of female in five monitoring points in Inner Mongolia, 2008-2010.

account for one tenth, ranked fourth for females account for one twentieth of all causes of death. The respiratory disease was the third for females.

As the second leading cause of death, the Neoplasm was analyzed. From 2008 to 2010, the crude mortality died from Neoplasm is 127.11 per million, these account for over one fifth of all deaths. **Figure 3** shows the proportion of common cancers by genders in five monitoring points in Inner Mongolia from 2008 to 2010. The distribution of the top three common cancers was same in male and female.

The most common cancer is lung cancer in both genders, accounting for over one fifth of the proportion for both genders, followed by the cancer of the liver and the gastric cancer. Additionally, females, the esophagus cancer, colon cancer, leukemia, brain tumor and pancreatic cancer are the common cancers. The breast cancer, colon cancer, leukemia, esophagus cancer and ovarian cancer are common cancers for females.

The mortality rates and the PYLL by genders for the top ten common cancers from the proportion were presented in **Table 1**. The top three ranking remained con-

Table 1. Common cancer in five monitoring points in Inner Mongolia, 2008-2010.

cancer site	mortality			PYLL		
	total	male	female	total	male	female
lung cancer	32.31	46.25	17.95	0.61	0.72	0.41
cancer of the liver	23.76	35.52	11.65	0.45	0.58	0.28
gastric cancer	16.15	23.39	8.68	0.30	0.37	0.20
esophagus cancer	12.03	20.29	3.51	0.22	0.32	0.08
colon cancer	5.63	7.03	4.18	0.10	0.11	0.09
leukemia	5.32	6.63	3.96	0.15	0.16	0.12
brain tumor	4.14	5.54	2.70	0.09	0.11	0.07
pancreatic cancer	4.12	5.32	2.88	0.08	0.08	0.07
breast cancer	—	—	7.65	—	—	0.17
ovarian cancer	—	—	2.88	—	—	0.06
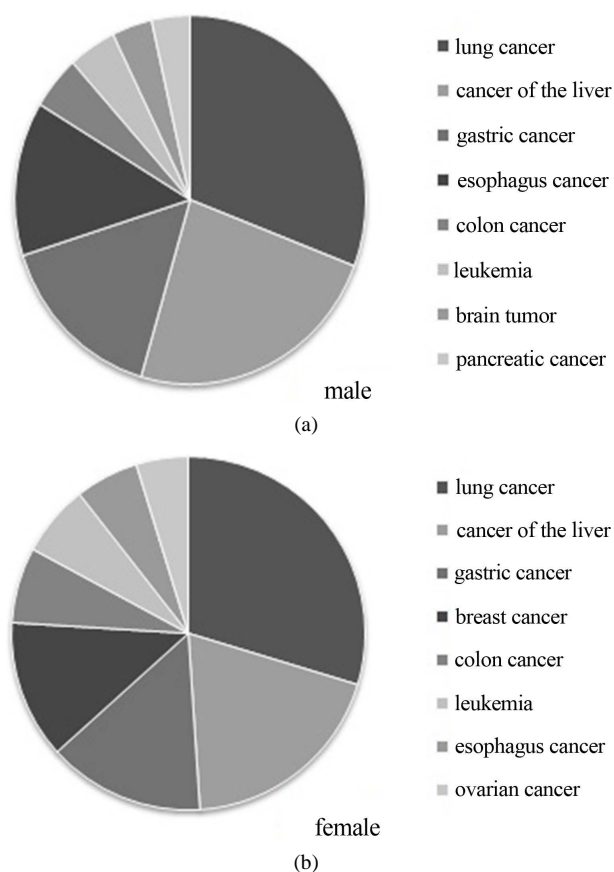
Figure 3. (a) Common cancer of male in five monitoring points in Inner Mongolia, 2008-2010; (b) Common cancer of female in five monitoring points in Inner Mongolia, 2008-2010.

stant in both genders. The lung cancer had the highest mortality rates and PYLL, followed by the cancer of the liver and gastric cancer in both genders. The breast cancer was the fourth leading cancer from mortality and PYLL for the female. The esophagus cancer ranked as the fourth for the male. The leukemia in male being the sixth from mortality ranked as fifth from the PYLL.

4. DISCUSSION

The crude mortality in Inner Mongolia is lower than the most Western countries, some Asia countries and China average level, higher than some Middle East countries [9]. As usual, the crude mortality in male was notably higher than in female.

The second leading causes of mortality for both genders were Neoplasm, keeping up with the diseases of the circulatory system. The estimate is similar to those obtained in other studies carried out in some west countries in recent years [5,6,10].

According to the National Central Cancer Registry, the mortality rate of cancer was 180.54 per million in China in 2009 [11], our study found that the cancer mortality in Inner Mongolia is lower, also lower than most west countries [4], however higher than some Africa countries [12].

Compared with other countries in the world, it is same that the lung cancer, liver cancer and gastric cancer ranked among the top three mortality rate cancers in both genders in our study [1]. The research of Wanqing Chen was consistent with ours for the top three ranking from cancer attributable to mortality and PYLL in 2009 [11]. In addition, the male cancer mortality and PYLL are notably higher than female, which is similar with in other countries [13].

The lung cancer has been the leading cause of all cancers. This pattern also appeared in studies in the most countries of Asia [14], North American for both genders and Europe in males [4,15,16]. The lung cancer is the third leading cause of cancer death among male and in

Europe is the second among female in Africa [12].

In our study, the stomach cancer for both genders has been the third leading cause of death among all cancer. It was similar with the worldwide in male, but in female is the fifth from stomach cancer mortality [1]. In the 1930s, gastric cancer was the most common cause of cancer death in US and Europe. For the past few decades, gastric cancer mortality has decreased markedly in most areas of the world [17]. Currently, the mortality of lung cancer is significantly higher and have exceeded stomach cancer with mortality.

The liver cancer was the second most frequent cause of cancer death in our study, however in the worldwide it was the third common cancer in male and the sixth in female [1]. The liver cancer was the fifth leading cause of cancer death in male and the ninth in female in the USA in 2010 [3].

In our study the female breast cancer was ranked the fourth among all cancers. In the worldwide the breast cancer had the highest proportion of cancer deaths for female was 13.7 in 2008 [1], the Chinese data was 6.95 [18]. The breast cancer mortality rate in our study was higher than Chinese average level, lower than worldwide.

The strengths of our study included standard classification, population level representation, complete national coverage assess, and recent statistics. First, we used the ICD-10 cause of death categories, making our methods similar to national and international studies. Second, three measures were used in our study: crude mortality, the proportion of cause of death and PYLL. We used a simple measure of premature mortality–expected years of life lost–that can be calculated from death registry data that is readily available, population-based, and it was expressed as the negative contribution to life expectancy of the common cancers [8]. Third, with the availability of population by genders estimates, we were able to use mortality and PYLL, compare the common cancers disparities. Additionally, our study determined that the status of the common cancer of the Inner Mongolia in the world.

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Author Contributions

YY, FZ and JS designed the study, acquired and analyzed the data, and prepared the manuscript. JS, ZL, ZL and WG assisted in the data analysis and interpretation. MD supervised the study.

Conflict of Interest

The authors declared that they have no competing interests.

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