Introduction

The incidence and mortality of malignant tumors have been increasing rapidly in recent years, and cancer has become one of the major causes of death as well as a vital public health problem worldwide. To analyze the disease constitution, the fatality rate and the major causes of death and master the epidemiological characteristic of malignant tumors is of great significance for cancer prevention and control. Our scientific research group analyzed the disease and death information of in-patients with malignant tumor in Sichuan Cancer Hospital from 2002 to 2012, in order to provide scientific basis for the prevention and control of malignant tumors

Materials and Methods

Objects of the study

The objects of our study included in-patients in Sichuan Cancer Hospital from January 1, 2002 to December 31, 2012 who met all the following criteria for analysis: (1) in-patients with the first diagnosis of malignant tumor based on ICD-10 classification principle, (2) The death report cards were written by the doctor in charge and had been reported to national mortality registration system.

Methods

Annual hospitalization and deaths information of all patients were retrieved based on the Hospital Information System (HIS). Each case was diagnosed pathologically. Death causes were classified according to the International Classification Diseases (ICD-10), and fundamental causes of death were used to be the major diagnosis principle.

Statistical Analysis

Chi-square test was used to compare the difference of rate among groups. Cochran Armitage trend test was adopted to analyze the trend of mortality over time. The level of significance (α) is 0.05. Data was analyzed with SPSS 16.0.

Results

The Analysis of the Disease Constitution

During the period from January 1, 2002 to December 31, 2012, the total number of in-patients with malignant tumor in Sichuan Cancer Hospital was 94853. The number of male in-patients was 49577 (52.3%), whereas the female was 45 276 (47.7%). The average age of in-patients was 54.05±13.73 years. The number of different age group (<40; 40-60; >60) was 14 741 (15.5%), 48 143 (50.8%)
Table 1. The Major Disease Types and Constitution of In-patients with Malignant Tumors

| Rank of | Total | Case(%) | Male | Case(%) | Female | Case(%) |
|---------|-------|---------|------|---------|--------|---------|
| Disease |       |         |      |         |        |         |
| 1       | lung cancer | 17222(18.2) | lung cancer | 12218(24.6) | cervical cancer | 11094(24.5) |
| 2       | cervical cancer | 11105(11.7) | esophagus cancer | 8161(16.5) | breast cancer | 8960(19.8) |
| 3       | esophagus cancer | 9882(10.4) | colorectal cancer | 4904(9.9) | lung cancer | 5004(11.1) |
| 4       | breast cancer | 9069(9.6) | liver cancer | 4011(8.1) | ovarian cancer | 3655(8.1) |
| 5       | colorectal cancer | 8325(8.8) | nasopharynx cancer | 3844(7.8) | colorectal cancer | 3421(7.6) |
| 6       | nasopharynx cancer | 5293(5.6) | gastric cancer | 3268(6.6) | esophagus cancer | 1721(3.8) |
| 7       | liver cancer | 4717(5.0) | lymphoma | 2441(4.9) | lymphoma | 1514(3.3) |
| 8       | gastric cancer | 4515(4.8) | bladder cancer | 792(1.6) | nasopharynx cancer | 1449(3.2) |
| 9       | lymphoma | 3955(4.2) | prostatic cancer | 629(1.3) | gastric cancer | 1247(2.8) |
| 10      | ovarian cancer | 3662(3.9) | pancreatic cancer | 585(1.2) | liver cancer | 749(1.7) |

Table 2. Case Fatality Rates of In-patients with Malignant Tumors from 2002 to 2012

| Year   | Cases | Deaths(%) | Male | Deaths(%) | Female | Deaths(%) |
|--------|-------|-----------|------|-----------|--------|-----------|
| 2002   | 1321  | 167(12.6) | 1027 | 127(12.4) | 294    | 40(13.6)  |
| 2003   | 4100  | 187(4.6)  | 2226 | 119(5.3)  | 1874   | 68(3.6)   |
| 2004   | 4450  | 197(4.4)  | 2362 | 124(5.2)  | 2088   | 73(3.5)   |
| 2005   | 4816  | 218(4.5)  | 2604 | 126(4.8)  | 2212   | 92(4.2)   |
| 2006   | 5230  | 267(5.1)  | 2812 | 183(6.5)  | 2418   | 84(3.5)   |
| 2007   | 6295  | 211(3.4)  | 3502 | 139(4.0)  | 2793   | 72(2.6)   |
| 2008   | 8320  | 232(2.8)  | 4346 | 143(3.3)  | 3974   | 89(2.2)   |
| 2009   | 11213 | 252(2.2)  | 5851 | 173(2.0)  | 5362   | 79(1.5)   |
| 2010   | 14248 | 299(2.1)  | 7451 | 186(2.5)  | 6797   | 113(1.7)  |
| 2011   | 16380 | 280(1.7)  | 8681 | 174(2.0)  | 7699   | 106(1.4)  |
| 2012   | 18480 | 274(1.5)  | 8715 | 178(2.0)  | 9765   | 96(1.0)   |
| Total  | 94853 | 2584(2.7) | 49577 | 1781(3.4) | 45276 | 912(2.0) |

Table 3. The Rank of Death Causes of 2584 In-patients with Malignant Tumor

| Rank of Causes of Death | Total Rank of Causes of Death | Male Rank of Causes of Death | Female Rank of Causes of Death |
|------------------------|-----------------------------|-----------------------------|-------------------------------|
| 1 lung cancer | 867(33.6) | 5 | lung cancer | 617(36.9) | 5 | lung cancer | 250(27.4) | 5 |
| 2 liver cancer | 275(10.6) | 5.8 | liver cancer | 232(13.9) | 5.8 | liver cancer | 101(11.1) | 1.1 |
| 3 colorectal cancer | 213(8.2) | 2.6 | esophagus cancer | 170(10.2) | 2.1 | colorectal cancer | 88(9.6) | 2.6 |
| 4 esophagus cancer | 193(7.5) | 2 | colorectal cancer | 125(7.5) | 2.5 | cervical cancer | 64(7.0) | 0.6 |
| 5 gastric cancer | 141(5.5) | 3.1 | gastric cancer | 86(5.1) | 2.6 | ovarian cancer | 60(6.6) | 1.6 |
| 6 lymphoma | 107(4.1) | 2.7 | lymphoma | 64(3.8) | 2.6 | gastric cancer | 55(6.0) | 4.4 |
| 7 breast cancer | 103(4.0) | 1.1 | pancreatic cancer | 53(3.2) | 9.1 | lymphoma | 43(4.7) | 2.8 |
| 8 pancreatic cancer | 84(3.3) | 9.6 | nasopharynx cancer | 45(2.7) | 1.2 | liver cancer | 43(4.7) | 5.7 |
| 9 ovarian cancer | 61(2.4) | 1.7 | prostatic cancer | 35(2.1) | 5.6 | pancreatic cancer | 31(3.4) | 10.8 |
| 10 nasopharynx cancer | 57(2.2) | 1.1 | gallbladder cancer | 25(1.5) | 8.8 | esophagus cancer | 23(2.5) | 1.3 |

The Analysis of the Rank of Death Causes

The death causes analysis of 2 584 in-patients with malignant tumor revealed that the top 10 death causes (ratio 81.3%) were as follows: lung cancer, liver cancer, colorectal cancer, esophagus cancer, breast cancer, pancreatic cancer, ovarian cancer and nasopharynx cancer. Patients with pancreatic cancer had the highest fatality rate (9.6%), whereas those with nasopharynx cancer had the lowest (1.08%) (Table 3).

The Analysis of the Rank of Death Causes and Fatality Rate in patients grouped by sex

Among the top 10 death causes of male, the fatality rate of pancreatic cancer was the highest (9.1%), while that of nasopharynx cancer was the lowest (1.2%). Among the top 10 death causes of female, the rate of pancreatic cancer was also the highest (10.8%), whereas that of breast cancer was the lowest (1.1%). In the top 10 death causes (except prostatic cancer, breast cancer, ovarian cancer and cervical cancer), the fatality rate of male with esophagus cancer was significantly higher than that of female with the same disease.
Table 4. The Rank of Death Causes of In-patients in Different Age Groups

| Rank of Causes of Death | <40 Years Old | 40-60 Years Old | >60 Years Old |
|-------------------------|--------------|----------------|--------------|
|                         | Causes (%)   | Fatality Rate (%) | Causes (%) | Fatality Rate (%) | Causes (%) | Fatality Rate (%) |
| 1. liver cancer         | 42(19.8)     | 4.7             | 311(30.7) | 3.7              | 525(38.6) | 6.6             |
| 2. lung cancer          | 31(14.6)     | 3.3             | 126(12.5) | 5.1              | 131(9.6)  | 3.7             |
| 3. lymphoma             | 30(14.2)     | 2.7             | 79(7.8)   | 1.7              | 110(8.1)  | 2.2             |
| 4. colorectal cancer    | 13(6.1)      | 1.4             | 69(6.8)   | 1.8              | 52(3.8)   | 11.8            |
| 5. gastric cancer       | 13(6.1)      | 3.5             | 59(5.8)   | 2.7              | 69(5.1)   | 3.5             |
| 6. breast cancer        | 11(5.2)      | 0.6             | 54(5.3)   | 0.9              | 38(2.8)   | 3               |
| 7. cervical cancer      | 10(4.7)      | 0.4             | 44(4.3)   | 2.7              |           |                |
| 8. brain tumor          | 10(4.7)      | 2.5             | 37(3.7)   | 1.6              | 33(2.4)   | 12.9            |
| 9. nasopharynx cancer   | 8(3.8)       | 0.7             | 34(3.4)   | 0.5              | 33(2.4)   | 2.8             |
| 10. leukaemia           | 6(2.8)       | 6.3             | 29(2.9)   | 7.4              | 31(2.3)   | 5.5             |

Discussion

According to the literatures (National Cancer Institute, 2012; Chinese Health Yearbook Editing Committee, 2010), in the 1990s, the major disease mortality of malignant tumors, cerebrovascular diseases and heart diseases occupied the first three positions sequentially. While in 2002, the mortality of malignant tumors, cerebrovascular diseases and respiratory system diseases turned to be at the top 3. In 2009, the mortality of malignant tumors, heart diseases and cerebrovascular diseases were at the top 3 among Chinese urban residents. Thus, from the end of last century to the future, the malignant tumors, which have become the main causes of death, have affected and will affect residents for a long time. This study was conducted to analyze the related disease constitution and death causes of hospitalized cancer patients and death cases in Sichuan Cancer Hospital from 2002 to 2012 which showed that the incidence of malignant tumors had been increasing gradually. The number of in-patients with malignant tumor in 2012 (18 480) had already been 14 times as that in 2002 (1321). The result is in accordance with which was reported in related domestic researches (Gao, 2007; Hao et al., 2012). Besides the increasingly serious environmental pollution, more and more work stress, psychological mental state such as anxiety and tension, unreasonable diet structure as well as the change of ecological environment and life style, high early detection rate which benefited from improved medical technology such as B ultrasonic, CT and so on also has close relationship with the gradually increased number of cancer patients. All kinds of endoscopic and advanced imaging equipment have played a significant role in the evaluation of the invasion degree as well as relationship between tumor and adjacent organs, blood vessels and nerve, thus be able to offer more definite diagnosis.

Disease constitution analysis found that lung cancer, cervical cancer and esophageal cancer were the top 3 cancers in our hospital. This finding is closely related to the pathogenesis characteristics of cancer in Sichuan Province and China. The Third Death Sampling Survey conducted by Ministry of Health shows that lung cancer is the leading cause of death among malignant tumors in our country, which has been confirmed by other related domestic literatures (Chen et al., 2009; Zhou et al., 2010; Hao et al., 2012). Meanwhile, Sichuan province has high incidence of malignant tumors, and the incidence and mortality of cancer in Sichuan province are higher than the national average level. The high incidence of esophageal cancer and cervical cancer in Sichuan province is much more obvious. Early detection and treatment project based on population has been implemented in Yanting county (Wang et al., 2012) which has global-representative high incidence of esophageal cancer as well as Northeastern Sichuan areas such as Wangcang county and Cangxi county which have high incidence of cervical cancer (Li et al., 2012). According to the monitoring on death causes of population in Sichuan province from 2002 to 2007 by Liu et al. (2012), the malignant tumors which mortality rate were at the top 3 positions were lung cancer, liver...
cancer, esophageal cancer. This result is slightly different from the research findings of our hospital. The relatively better treatment efficacy of cervical cancer than other cancers may make an impact. Sichuan Cancer Hospital is a specialized hospital with most of its patients from Sichuan province and the surrounding areas, thus the obtained cancer spectrum is consistent with the characteristics of cancer in Sichuan area.

Mortality of hospitalized patients is an important indicator to reflect the diagnosis and treatment ability of one hospital. In our hospital, the number of hospitalized cancer patients had increased year by year from 2002 to 2012, but the total cancer fatality rate and gender fatality declined with years thanks to the constantly improved medical technology. The fatality analysis of the top 10 death causes of the malignant tumors revealed that the eighth cancer: pancreatic cancer had the highest fatality rate. Gender distribution showed that pancreatic cancer had the highest fatality rate among the top 10 causes of death regardless of male or female. Age distribution told that among 40-60 years population, pancreatic cancer had the highest mortality, in sixty years and above population group, mortality rate of gallbladder cancer was the highest, followed by that of pancreatic cancer which was as high as 11.8%. It is suggested that the prevention and control work of cancer should be enhanced not only for the cancer with high incidence such as lung cancer, esophageal cancer but also for the cancer which has low incidence but high fatality rate, such as pancreatic cancer and gallbladder cancer, and this would help to improve the survival rate and life quality of cancer patients in the future.

Along with high-speed development of social economy, people’s living conditions have been greatly improved and the health state has been enhanced to some extent, but malignant tumors, which haven’t got enough control, are still threatening the health of urban and rural residents in our country. At the same time, our several-year health work practice showed that the vast majority of cancers can be prevented or be treated.

The public awareness of major risk factors for cancer can be raised by active health education. The comprehensive prevention and control including serious experience analysis, cause study, health education, environment management, life-style intervention, early-detection and treatment and cancer registration etc. should be strengthened to make them play a significant role in the prevention and control of malignant tumors.

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