Survival of All Cancer Patients in Korea through 2-Year Follow-Up

Cancer is the most frequent cause of death in both developing and developed countries, including Korea. The aim of this study was to present survival rates of Korean cancer patients. Survival analysis was carried out with data collected under the Korea Central Cancer Registry Program, which included all cancer patients diagnosed from January 1, 1997 to December 31, 1997. We have analyzed the effects of age at diagnosis and sex on cancer survival from the cancer registry data of 64,240 Korean patients diagnosed of cancer in 1997. The overall survival rate of all Korean cancer patients (both men and women) was 67% at 1 yr and 57% at 2 yr. The 1- and 2-yr survival rates for all cancers in men were 58% and 47%, respectively, while those in women were 77% and 69%, respectively. Men had a lower survival rate than women in most malignancies. The pancreatic cancer was shown the lowest 1-yr survival rate.

Key Words : Neoplasms; Survival; Korea

INTRODUCTION

Cancer is the most frequent cause of death in both developing and developed countries, including Korea (1). The necessities for studying survival in patients with cancer include monitoring the global effect of diagnostic and treatment improvements, establishing priorities for healthcare investment and research, and estimating the potentialities for further improvement (2). A report on population-based survival from cancer has not been published in Korea. However, there is a program called Korea Central Cancer Registry (KCCR) program, which has been collecting all cancer data on a routine basis from nation-wide, hospital-based cancer registries in various designated areas of the country since 1980 (3). Trends in cancer prevalence in Korea could be obtained from this database.

The aims of this study were to present survival rates in Korean cancer patients and to evaluate their age and gender differences utilizing data from the KCCR program.

MATERIALS AND METHODS

Study cohort

The KCCR Program began in 1980 at 47 resident-training general hospitals in Korea, and was expanded to 159 hospitals, including almost all university hospitals (3). These hospital-based reports were estimated to cover about 80 percent of newly diagnosed malignancies in Korea. Survival analyses were carried out with data collected under the KCCR Program, which included all cancer patients diagnosed from January 1, 1997 to December 31, 1997. We have analyzed the effects of age at diagnosis and sex on cancer survival from the cancer registry data of 64,240 Korean patients diagnosed of cancer in 1997, and compared them with the U.S.A. data (4). For each patient, date of birth, date of diagnosis, age at diagnosis, gender, address, primary site of cancer by ICD-O/2 (Oncology) code, histological verification, and morphology were recorded. Age at diagnosis was calculated based on the date of diagnosis in KCCR data and was classified into the following 5-yr age groups: 0-4, 5-9, 10-14, 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 74-79, and 80 or over. The cancers were microscopically confirmed in 85.1% of cases, and in cases of multiple tumors, only the initially diagnosed tumor was included. Registered cancer data were matched with vital status (alive/dead) from the national population files. The vital status of each registered case was verified until December 31, 1999. The follow-up of patients could be regarded as practically complete for cancer registry because we updated the vital status of patients through the national population files, such as the data from the Ministry of
Government Administration and Home Affairs.

Statistical methods

Cumulative observed survival rates (OSR) were calculated by the life table method. To estimate the relative risk (RR) of sex and age against survival rate, the data were analyzed by means of Cox’s proportional hazard model using SAS release 6.12. And for the international comparison of survival rates, the relative survival rates at 1 and 2 yr from diagnosis were computed for patients (4). The relative survival rate (RSR) is defined as the ratio of the survival probability of a cancer patient to the survival probability for an individual from the general population having the same set of prognostic factors for death: sex, age, and time period (5). It was expressed by percents.

RESULTS

Overall Survivals

Fig. 1 shows the overall survival curve for men and women observed for 2 yr. Women showed a higher OSR than men throughout the period. The OSR of all cancer patients (both males and females) was 67% at 1 yr and 57% at 2 yr. The OSR was 58% in men and 77% in women at 1 yr from diagnosis. At 2 yr, the OSR decreased to 47% in men and 69% in women. The RR of dying within 2 yr for women was 0.49 when that for men were considered to be 1.0 (Table 1).

Overall survival rate showed some striking differences according to the primary sites of neoplasm (Table 2). Pancreatic cancer had the lowest 1-yr OSR of 24%, followed by malignancy of unknown origin (33%), gallbladder cancers

| Age (yr) | Male No. | % | 1-yr SR | 2-yr SR | RR (95%CI) | Female No. | % | 1-yr SR | 2-yr SR | RR (95%CI) |
|----------|----------|---|---------|---------|------------|------------|---|---------|---------|------------|
| 0-4      | 226      | 0.64 | 83 | 74 | 1.0 | 164 | 0.57 | 82 | 74 | 1.0 |
| 5-9      | 124      | 0.35 | 78 | 71 | 1.15 (0.75-1.76) | 109 | 0.38 | 83 | 75 | 0.75 (0.46-1.22) |
| 10-14    | 131      | 0.37 | 81 | 62 | 1.12 (0.73-1.71) | 109 | 0.38 | 84 | 80 | 0.71 (0.43-1.18) |
| 15-19    | 210      | 0.59 | 76 | 67 | 1.46 (1.03-2.07) | 208 | 0.72 | 85 | 76 | 0.82 (0.55-1.23) |
| 20-24    | 216      | 0.61 | 69 | 62 | 1.82 (1.30-2.55) | 399 | 1.17 | 88 | 84 | 0.52 (0.35-0.76) |
| 25-29    | 367      | 1.04 | 71 | 64 | 1.74 (1.27-2.37) | 820 | 2.84 | 89 | 85 | 0.53 (0.38-0.74) |
| 30-34    | 616      | 1.74 | 68 | 60 | 1.88 (1.41-2.52) | 1,608 | 5.76 | 84 | 76 | 0.56 (0.41-0.77) |
| 35-39    | 1,251    | 3.54 | 68 | 60 | 1.94 (1.47-2.57) | 2,814 | 1.04 | 89 | 84 | 0.49 (0.36-0.67) |
| 40-44    | 1,844    | 5.22 | 66 | 57 | 2.14 (1.63-2.81) | 2,956 | 10.23 | 89 | 84 | 0.59 (0.44-0.79) |
| 45-49    | 2,480    | 7.02 | 62 | 51 | 2.50 (1.91-3.28) | 2,785 | 9.63 | 85 | 79 | 0.75 (0.56-1.01) |
| 50-54    | 3,550    | 10.05 | 61 | 51 | 2.57 (1.96-3.35) | 2,793 | 9.66 | 82 | 75 | 0.95 (0.71-1.28) |
| 55-59    | 5,768    | 16.33 | 60 | 49 | 2.69 (2.06-3.51) | 3,379 | 11.69 | 78 | 70 | 1.19 (0.88-1.59) |
| 60-64    | 6,145    | 17.39 | 58 | 46 | 2.90 (2.23-3.78) | 3,387 | 11.72 | 73 | 65 | 1.41 (1.06-1.90) |
| 65-69    | 5,140    | 14.55 | 55 | 43 | 3.16 (2.42-4.12) | 2,976 | 10.29 | 66 | 57 | 1.84 (1.37-2.47) |
| 70-74    | 3,844    | 10.88 | 52 | 40 | 3.46 (2.64-4.51) | 2,293 | 7.93 | 59 | 49 | 2.36 (1.76-3.17) |
| 75-79    | 2,318    | 6.56 | 46 | 35 | 3.97 (3.04-5.20) | 1,412 | 4.88 | 52 | 40 | 2.93 (2.18-3.95) |
| 80-      | 1,099    | 3.11 | 41 | 30 | 4.65 (3.54-6.11) | 877 | 3.03 | 41 | 32 | 3.85 (2.86-5.20) |
| Total    | 35,239   | 55.00 | 58 | 47 | 1.0* | 28,911 | 45.00 | 77 | 69 | 0.49 (0.48-0.51) |

*The relative risk of dying within 2 yr for women was calculated with the reference value of 1.0 for men.

![Fig. 1. Overall 2-yr survival rates for all cancers in Korean men and women between 1997-1999.](image1)

![Fig. 2. Overall 1- and 2-yr survival rates for all cancers in Korean men and women by age and sex between 1997-1999.](image2)
(35%), liver cancer (39%), lung cancer (40%), and esophageal cancer (44%). These cancers comprised 32.1% of all cancers. The 2-yr OSR was similar in order except for the fact that lung cancer showed a slightly worse survival (26%) than liver and gallbladder cancers (29% for both).

Age-related differences

The 1- and 2-yr OSR for men and women in 5-yr age groups are given in Table 1. The OSR showed different results between men and women (Fig. 2). With reference value of 1.0 for the 0-4 yr age group, the 2-yr survival rate generally decreased with age in men. But in women, the OSR began to increase around the 20-24 yr-age group, remained relatively steady thereafter, and started to decrease around the age of menopause (after 45).

Gender-related differences

Table 3 shows the OSR of tumor-specific deaths at 1 and 2 yr from the time of diagnosis for both men and women. Considering the overall age-adjusted survival, the risk of dying was similar in men and women for most malignancies, except for cancers of the esophagus, larynx, bladder, breast, and skin.
In the present, women had significantly better survival rates than men at both 1 yr and 2 yr from the diagnosis of cancer. Women generally have a much longer life expectancy than men at both 1 yr and 2 yr from the diagnosis of cancer. Relative survivals

Table 5. Relative survival rates (RSR, %) of second year in Koreans according to the primary sites of neoplasm and sex

| Site                | ICD-10 | Male RSR (95% CI) | Female RSR (95% CI) |
|--------------------|--------|-------------------|---------------------|
| All                | C00-C07 | 50.7 (50.2, 51.2) | 71.8 (71.2, 72.3) |
| Head & Neck        | C00-C14 | 60.7 (57.5, 63.9) | 76.9 (72.1, 81.7) |
| Esophagus           | C15     | 32.1 (29.4, 34.8) | 32.8 (23.5, 42.0) |
| Stomach             | C16     | 60.3 (59.2, 61.3) | 60.9 (59.4, 62.3) |
| Colo-rectum*       | C18-20  | 74.8 (73.1, 76.4) | 74.6 (72.8, 76.4) |
| Liver               | C22.0   | 32.4 (31.1, 33.7) | 35.6 (33.0, 38.3) |
| Pancreas            | C25     | 18.3 (15.5, 21.1) | 18.6 (15.4, 21.8) |
| Bronchus & lung     | C34     | 26.9 (25.8, 28.1) | 32.3 (30.0, 34.6) |
| Breast              | C50     | 92.5 (91.6, 93.4) | 92.8 (92.1, 93.5) |
| Cervix uteri        | C53     | 92.8 (92.1, 93.5) | 92.8 (92.1, 93.5) |
| Prostate            | C61     | 83.7 (80.3, 87.2) | 86.8 (83.1, 90.5) |
| Kidney              | C64     | 74.8 (68.8, 80.8) | 76.0 (70.3, 81.7) |
| Thyroid             | C73     | 97.0 (96.0, 98.0) | 97.0 (96.0, 98.0) |

*Age-truncated 0-84, 95% Confidence Interval of Age-adjusted RSR.

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