Cancer Map between 2010-2019 Sivas City

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Abstract: We sought to evaluate the trends in age-standardized incidence rates of cancer by gender, age, and types in the Sivas province of Turkey between the years 2010-2019. Data were obtained from the Sivas Public Health Department Cancer Unit and the Cumhuriyet University Hospital Cancer Record Unit for the studied period. Data were presented as incidence rates in age, gender, and of the cancer types by using world age-standardized incidence rate (ASR-W) per 10^5 populations. Of the 10928 registered new cases of cancer during the study period, 46% (5060) were female, and 54 % (5868) were male. The ASR-W of all cancers was 195.2 per 10^5 in males and 168.3 per 10^5 in females. The ASR-W was found as increased for both genders over the 10 year period. Among the cancer types in both genders the incidences were found as gastrointestinal system cancer (GIS) (ASR-W= 32.4), lung cancer (ASR-W = 22.1), breast cancer (ASR-W = 37.6), male genital system cancer (MGS) (ASR-W = 36.5), and thyroid cancer (ASR-W = 17.3) in decreasing frequency. Among the females breast (ASR-W = 37.6) cancer was the most common followed by thyroid (ASR-W= 27.3, GIS (ASR-W = 23.2), female genital system (FGS) (ASR-W = 18.2) and hematopoietic system (HPS) (ASR-W = 12.9) cancers. The greatest incidence in males was for GIS cancer (ASR-W = 41.9), followed by MGS (ASR-W = 36.2), lung (ASR-W = 35.9), urinary system (21.5) and HPS cancers (ASR-W = 17.3). The cancer incidence rate in males was found to be higher than in females from 2010 to 2019, and the incidences of some cancers were observed as decreased in both genders. As a result it is concluded that raising public awareness about the risk factors for cancer and the development of appropriate and effective screening programs to provide more reliable data for cancer prevention and control programs in Sivas province is necessary.

INTRODUCTION

Cancer is one of the most important causes of death for the people living in all parts of the world and it is the greatest factor that prevents the increase in average life time in the world [1]. According to the data of the World Health Organization (WHO) in 2019, cancer is the first or second cause of death before the age of 70 years in 112 countries and is the third or fourth in the ranking of diseases that cause death in different 23 countries [2]. Recently, cancer incidence and cancer-related death rates continue to increase rapidly throughout the world [3]. The acquisition of the identifying information about the individual, region, time and personal differences will be useful for the correct and effective way of cancer control plans. Cancer registration systems in the world and those recently established in our country are defined as a process that includes the knowledge how the disease appears, continuous and systematic collection of data about the characteristics and results, analysis and evaluation of the disease in patients and it is used to measure the effect of cancer in society in order to struggle with cancer [4].

Cancer prevalence is increasing day by day in parallel with the increase in the world population. This increase is more common in older ages than young people [4]. In this study, it is aimed to evaluate the characteristics of the gender, age distribution, living location and cancer type of patients diagnosed in Sivas province with a population of 646.608 persons between 2010-2019.

MATERIAL and METHODS

Ethical approval
The study was conducted with the approval of the Sivas Cumhuriyet University Non-Invasive Ethics Committeewith the decision dated 18.03.2020 and numbered 2020-03/41

Study design
The study population was composed of all patients diagnosed as cancer in Sivas, a Middle Anatolian province, between the years 2010-2019. This retrospective study was carried out on data derived from the Sivas Public Health Department Cancer Unit and Cumhuriyet University Hospital Cancer Record Unit. After data entry, all duplicates were removed. Then, information related to

characteristics including age, gender, and cancer type were reorganized.

Cancer cases were divided Into 18 types as follows: Lung, Head and Neck, Brain, Skin, Others (Abdomen,Omentum,Peritone), Endocrine System, Male Genital System (MGS), Gastrointestinal System (GIS), Hematopoietic System (HPS), Female Genital System (FGS), Cardiovascular Sytem-Mediastinum, Bone, Breast, Biliary Ductus-Liver-Pancreas, Central Nervous System - Peripheral Nervous System, Thyroid, Urinary System and Soft Tissue. World Age-Standardized incidence Rates (ASR-W), which were obtained using the world standard population, were calculated for each of the five age groups (0-17, 18-44, 45-64, 65-79, 80 and above)

Data analysis was performed using SPSS statistics (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp) based on Age-Standardized incidence Rates in both genders. Age-Standardized incidence Rates were also directly calculated according to the World Standard Population. Descriptive Statistics and Linear Regression Analysis were performed to determine the trends in Age-Standardized incidence Rates of cancer incidence. The significance level was considered as $P < 0.050$.

RESULTS

The ASR-W for all cancer types by age groups for both genders is demonstrated in Table 1 and Figure 1. ASR-W was higher among females aged 18-44 years or younger (Table 2 and Figure 2). Eventhough this was not statically significant ($p > 0.050$), The rate was significantly higher in male aged 65 years or over ($p < 0.050$). The ASR-W was 238,0 in male and 162,2 in female for the time period studied (Table 3). Gastrointestinal system cancers (ASR-W = 42,0) was the most common cancer type in males and followed by male genital system cancer (ASR-W = 36.2), lung cancer (ASR-W= 35.9), urinary system cancer (ASR-W= 21.5), and hematopoietic system cancer (ASR-W= 17.3) Figure 3. Breast (ASR-W= 37,6) was the most common type of cancer in females followed by thyroid cancer (ASR-W= 27.3), gastrointestinal system cancer (ASR-W= 23.2), female genital system cancer (ASR-W= 18.2), and hematopoietic system cancer (ASR-W= 12.9) Figure 4. Our study showed that ASR-W of the most commonly diagnosed cancers differs by gender and age.

This study was carried out by reaching the information of a total of 10,928 patients in order to evaluate cancer cases in Sivas, and according to the type of cancer. After reaching the information of the patients, the following results were obtained.

- Totally 10928 people were diagnosed as cancer in Sivas city between the years 2010 to 2019.
- Of the 10928 cancer patients diagnosed, %54 were men and 46% were women.
- The most common types of cancer in Sivas province were GIS cancer (18%), lung cancer (12%), breast cancer (11%), male genital system cancer (10%), thyroid cancer (10%) in all population regardless of the gender (Figure 5).
- The most common cancer-type was colorectal cancer in GIS (57,4%). 62% of the total number of patients seen in GIS cancers were male and 38% were female patients.
- Five most common types of cancer in men in Sivas between 2010-2019 were GIS cancer (21%), male genital system cancer (19%), lung cancer (19%), urinary system cancer (11%) and hematopoetic system cancer (9%) respectively in decreasing ratios.
- Five most common types of cancer in female in Sivas between 2010-2019 Breast cancer (22%), thyroid cancer (16%), GIS cancer (14%), female genital system cancer (11%) and hemapoetic system cancer (8%) respectively in decreasing ratios.
- When the cancer case numbers were evaluated according to the districts of Sivas, the ratios of the cancer cases distributed in decreasing number as follows. Yıldızeli (24%), Zara (12%), Kangal (11%), Şarkısla (10%) and Suşehri (9%).
- In Yildizeli where the number of the cancer cases was highest among the districts, lung cancer was the most common cancer type.

Table 1. World age-standardized incidence rate for all cancer cases by gender in Sivas, Turkey, from 2010 to 2019.

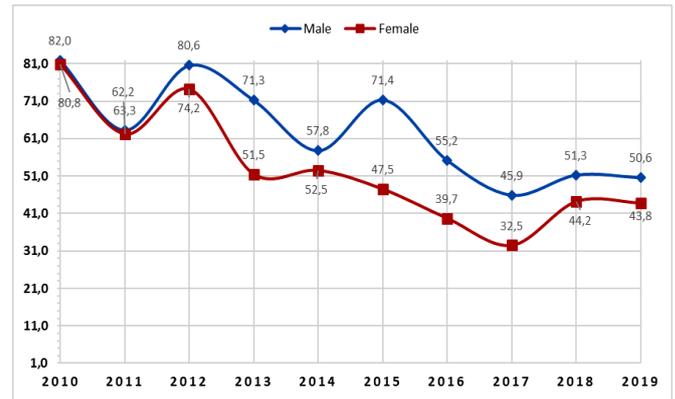| Year	Male	Female	Rate
2010	82.0	80.8	1.0
2011	63.3	62.2	1.0
2012	80.6	74.2	1.0
2013	71.3	51.5	1.4
2014	57.8	52.5	1.1
2015	71.4	47.5	1.5
2016	55.2	39.7	1.4
2017	45.9	32.5	1.4
2018	51.3	44.2	1.2
2019	50.6	43.8	1.2
Mean	62.9	55.9	1.2

Figure 1. female and male cancer incidence rates

Table 2. World age-standardized incidence rate for all cancer cases by gender and age in Sivas, Turkey

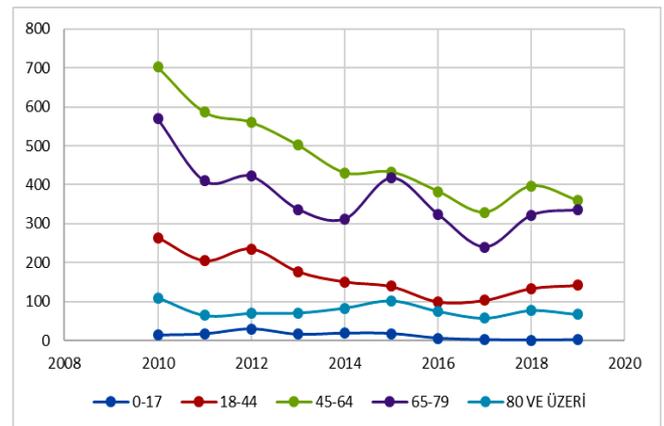| Age group years	Male	Female	Male/female
0-17	50.1	28.1	1.8
18-44	220.0	368.1	0.6
45-64	180.1	156.4	1.2
65-79	353.1	201.2	1.8
>80	291.3	181.7	1.6

Figure 2. Evaluation of cancers in Sivas province according to the age distribution of cancers in Sivas

Table 3. World age-standardized incidence rate for different cancer types by gender in Sivas, Turkey, from 2010 to 2019.

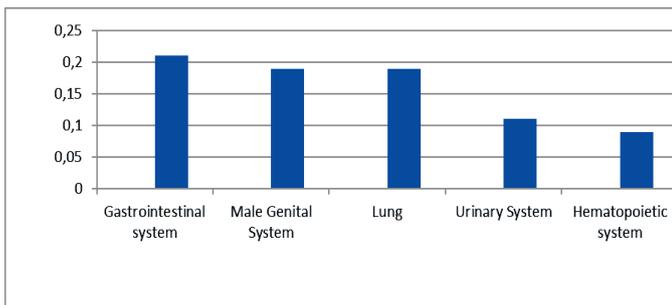| Cancer type	male	female
GIS	42.0	23.2
Lung	35.9	9.6
Breast		37.6
MGS	36.2	
Thyroid	9.2	27.3
FGS	18.2	
HPS	23.1	17.2
Urinary system	18.2	7.7
Brain	9.6	9.2
Skin	12.4	9.1
Endocrine	1.2	1.0
Bone	1.6	1.2
CVS- Mediastinum	1.1	1.0
Biliary ductus, liver, pancreas	6.4	5.8
Soft tissue	4.1	3.3
CNS– PNS	1.2	1.0
Other (abdomen, omentum, peritone)	1.4	1.2
Head – Neck	16.2	6.8
All Cancers	238.0	162.2

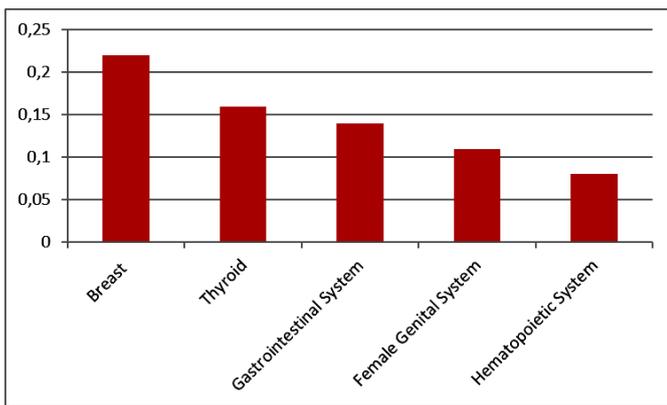**Figure 3.** Most common cancer types in men in Sivas between 2010-2019

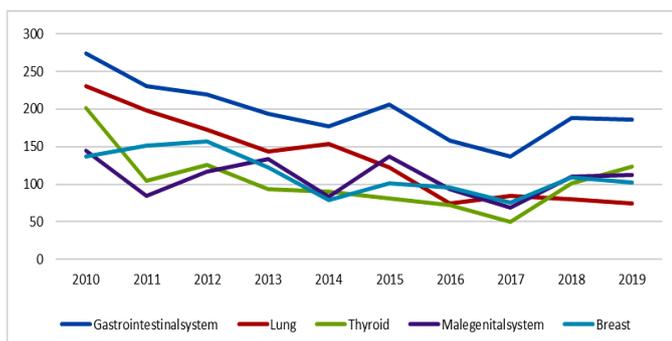**Figure 4.** Most common cancer types in females in Sivas between 2010-2019

Figure 5. World age-standardized incidence rate for all cancer cases by gender and age in Sivas, Turkey

DISCUSSION

We investigated the incidences and types of common cancers in the Sivas province according to gender, age distribution, living location and cancer types from 2010 to 2019. Over the 10 years study period, cancer cases exhibit some interesting incidences and trends.

In the study conducted by Celikgun, in which cancers cases were examined in Sivas city between 2004-2014, the reported cancer rate in men was found to be 57% that was similar with the rate of 54% that we found in our present study [5]. According to WHO data about cancer incidence rates will assumed to almost double by the year 2030, and most of the increases (75%) are predicted to occur in non-developed country [6].

As indicated by the Ministry of Health Department of Cancer Control database in Turkey, cancer incidence rates increased from 133,78 per 10^5 in 2002 to 173,85 per 10^5 in 2005. Also, the age-adjusted cancer rates for males and females in 2012 were reported as 277.7 per 10^5 and 188.2 per 10^5 respectively [4].

Similar to these reports, a serious review in the cancer incidence rate was observed in this study. The value of ASR-W in our study was 195,2 per 10^5 for males and 168,3 per 10^5 for females, which was lower than the value of ASR-W in Turkey and in Central and Eastern Europe (260.0 in males and 193,5 in females per 10^5), but higher than the value of ASR-W in Western Asia (192.8 in males and 150.2 in females), yet similar to the world value [7].

Changes in the cancers incidences either upwards or downwards by the years may be explained as the result of changes in environmental factors (e.g, electromagnetic waves, radiation, chemicals, compounds in cosmetics, ınsecticides and pesticides, food additives, pharmaceutical drugs) and changes in lifestyle, including consumption of fatty foods fast foods, tobacco smoking, sedentary lifestyle as well as rapidly growing elderly population [8-11].

According to the data obtained in the study, cancer rate in Sivas province has been determined to be highest in the year 2010. The decrease observed by the years after 2010 was thought to be dependent on regulations in cancer records.

Our study findings showed that the proportion of common cancer cases in males was higher than in females (54% vs. 46%). These findings were opposite to the results obtained from Europe, where the incidence of various cancers was higher in males than females (57% etc. 43%) [12].

Our study revealed that GIS cancer in males and breast cancer in females were the most common cancer types in relation to gender. The second most common cancers were genital system cancer in males and thyroid cancer in females. In similar studies performed in Turkey, it was shown that the most common cancer in men was found to be lung cancer (60.4 per 10^5) and was reported as breast cancer (46.8 per 10^5) in women [13,14].

Our study sowed that breast cancer was the most common cancer in females (ASR-W= 37.5). Thyroid cancers are the second most common type of cancer in women. When compared to males higher incidence of thyroid cancer in women (ASR-W= 27,3) (ASR-W = 9.2) requires further investigations to determine whether these findings were the result of the more common use of diagnostic imaging that allows to more frequent and early detection of smaller, asymptomatic tumors of the thyroid gland especially in childhood and adolescence is recognized as a risk factor for the development of thyroid cancer [15].

In recent years, various studies have shown that there has been a significant ıncrease in the incidence of thyroid cancer. A recent study from Cyprus reported a higher rate for thyroid cancer in females and showed that the incidence has doubled in just one decade [16]. A similar pattern of increase has also been reported in western European countries [17].

Similar to our study, it was reported by Celikgun that thyroid cancer was the 4th most common cancer with a frequency of 11% among all the cancer cases in the population and was also the most common type of cancer with 19% frequency in women in a study performed on cancers seen in Sivas city between the years of 2004 to 2014[5].

Similar to the incidence rate in developed countries, prostate cancer is the first most common cancer among males in our study while being the second most common cancer worldwide and in Turkey [18]. This evidence suggests an increase in the incidence of prostate cancer in the future although the main cause of this cancer (and similarly of other types of cancer) is unknown yet [19, 20].

Similar to our study, according to Globocon 2020 report in Turkey the most common cancers in men were lung cancer (25.8%), prostate cancer (14.6%), colorectal cancer (9%), bladder cancer (7.9%) and stomach cancer (6.2%) respectively. The same report also declared that in Turkey the most common cancers in women are breast cancer (23.9%), thyroid (10.9%), colorectal cancer (9.2%), lung cancer (7%) and corpus uteri cancer (5.9%) in decreasing order. The most common cancer types in frequency excluding the gender difference were found as lung cancer (17.6%), breast cancer (10.3), colorectal cancer (9.1%), prostate cancer (8.3%) and thyroid cancer (5.9%) [21].

Conflict of interest

Authors declare that they have no financial interests or personal conflicts that may affect the study in this article.

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