Original Article

Epidemiology and Clinical Investigation of all Cancer Types in Kermanshah, Iran (2010–2019)

Abstract

Background: Epidemiological studies of cancer worldwide can help identify the prevalence of common cancers in the region and may help to organize their control. The study's purpose was to investigate the frequency of cancer in the urban and rural areas in the West of Iran in both sexes based on the pathological data from a single clinical center (2010–2019). **Subjects and Methods:** A cross-sectional study was designed to assess the demographic and clinical information was obtained from the pathology reports. Organs involved in cancer based on the international classification of disease 10th revision were coded. The variables extracted were sex, age, time of diagnosis, cancer site, and residency status. Quantitative and qualitative variables were analyzed with an appropriate statically analyzing test using the SPSS software. **Results:** Of the 7728 registered cancers (2010–2019) with mean age 58 ± 17 years, 3384 (44%) were female, 4341 (56%) were male, 2025 cases (26.2%) were rural, and 5687 cases (73.8%) were urban. Regarding the frequency of cancers and the age of diagnosing cancer, there was a statistically significant association between the two genders ($P < 0.05$). However, no similar conclusion was reached concerning residence status. **Conclusion:** The most common cancer in both genders was bladder, colorectal, and breast cancer. The frequency of cancers, despite the differences in the percentage of cancers between the two sexes, did not follow the same pattern as other cities in Iran and the world. Our study confirmed that the prevalence of cancer may follow the pattern of the geographical area.

Keywords: *Epidemiology, neoplasms, pathology clinical*

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Introduction

Cancer epidemiological studies provide information about the distribution of cancer in a population and also help to identify cancer determinants, so the knowledge gained is used to control the disease. On the other hand, information about the diagnosis, treatment, and relief is obtained through clinical epidemiological studies along with systematic studies and meta-analyses. The information obtained is needed to support evidence-based protocols and design approaches for estimating clinical priority criteria.[1]

Cancer was the second-leading cause of death with over 8.7 million deaths in 2015.[2] In 2018, seventeen million new cases of cancer and 9.5 million cancer deaths worldwide were reported, according to the international agency for research on cancer. By 2040, the global burden of population growth and aging is projected to reach 27.5 million new cases of cancer and the death toll from cancer will rise to 16.3 million. The factors such as smoking, unhealthy diet, physical inactivity, and declining labor will increase the incidence and increase the risk of cancer in developing countries, and the combination of these factors will further increase the burden of cancer in future.[3] Cancer is the third cause of mortality in Iran after cardiovascular and accidents.[4] Overall, 112,131 new cancer cases were registered in INPCR in 2014, of which 60,469 (53.9%) were male.[5]

Iran as a country that has faced one of the most important factors for an increased incidence of cancer, i.e., aging, is required to put the cancer control programs as a priority of the main agenda for the control of noncommunicable diseases (NCDs).[6]

In 2012, it was reported that 287372 (357/100,000) Iranians died of NCDs (77% of all deaths), of which 53837

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deaths were due to cancer (61.72/100,000, or 13.3% of all death). Effective Cancer Control Planning depends on reliable data on cancer incidence at the regional and national levels.[7] According to a 2005 study by Sadjadi *et al*., the incidence of cancers of the gastrointestinal tract (including stomach, esophagus, and colorectal), breast and cervix (in the female), and prostate (in the male) were higher than other cancers. Furthermore, esophageal and gastric cancers in Iran were higher than the global average, while lung cancers in Iran were not among the five most common cancers in Iran.[8]

The cancer registration system and access to epidemiologic data on specific cancers of each region can be effective in implementing appropriate methods of prevention and treatment of cancer. One of the methods for collecting data of cancer cases is based on pathology which its result is published as annual reports.

In this article, a 10-year report on the frequency of cancer in urban and rural areas in both sexes, based on pathological data in Kermanshah province, is presented.

Subjects and Methods

Procedures adopted in this study have been approved by the local ethics committee and are according to the Declaration of Helsinki principles. Data were obtained from a single clinical center in Kermanshah. Kermanshah is located in the western part of Iran, its population is 10,46,000 (2019 estimate). It has a moderate and mountainous climate (en.wikipedia.org/wiki/Kermanshah).

According to the cancer registration center report, Imam Reza Hospital (our study clinical center) included one-third to two-thirds of all data recorded gathered during the last decade. The demographic and clinical information was extracted from the pathology reports, and organs involved in cancer based on the international classification of disease 10th revision were coded. The variables extracted were sex, age, year of diagnosis, cancer site, and residence (urban and rural areas). The statistical analysis was done using SPSS software (PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc). Depending on the distribution of the variables, the quantitative variables were described as mean ± standard deviation and median. Qualitative and ordinal variables were described as numerical values and related percentages. Finally, to compare the two groups, depending on the type of variables, *t*-test and Chi-square tests or their nonparametric equivalents were used.

Results

Of the 7728 registered cancers (2010–2019), 3384 (44%) were female and 4341 (56%) were male. The mean age of onset of cancer was 58 ± 17 years (53.5 ± 17 years in women, and 61.3 ± 17 years in men). In terms of age, there was a significant difference between the two groups of men and women ($P < 0.001$).

Out of the total cancer cases registered, 2025 cases (26.2%) were related to the rural, and 5687 cases (73.8%) were related to the urban areas [Table 1]. The frequency of all cancer types based on the residency situation is presented in Tables 2 and 3 for females and males, respectively.

Comparing the percentage of different cancers between urban and rural women, cancers of the breast, small intestine, cervix, stomach, bladder, thyroid, lip and oral cavity, nasopharynx, and paranasal were more common in rural women than in urban women. On the other hand, the percentage frequency of esophageal, pancreas, lung, other thoracic organs, bone, brain, lymphoma, leukemia, peritoneum, and parathyroid cancers was higher in urban women than in rural women [Table 2]. This case for urban men as compared to rural men include cancers of the lips and oral cavity, colorectal, liver, pancreas, lung, prostate, bladder, lymphoma, leukemia, and soft tissue. While the percentage of cancers of the stomach, esophagus, bile,

Table 1: Frequency of cancer types based on residency situation, a single clinical center frequency of new cancers in Kermanshah (from 2010 to 2019)

Tumor site	Urban	Rural	Total
Lip/oral cavity/pharynx	35	18	53
Nasopharynx/paranasal	10	3	13
Esophagus	152	82	234
Stomach	467	189	656
Colorectal	560	183	743
Liver	170	52	222
Gall bladder/ampulla vater	54	23	77
Pancreas	26	10	36
Larynx	9	3	12
Lung	236	74	310
Other thoracic organ	88	30	118
Bone	81	34	115
Melanoma/other neoplasm of skin	378	129	507
Breast	536	137	673
Cervix/uterus	171	47	218
Ovary	106	36	142
Prostate	386	128	514
Testis	50	19	69
Kidney	221	76	297
Bladder	739	235	974
Brain/CNS	176	73	249
Thyroid	302	100	402
Lymphoma	123	37	160
Leukemia	267	75	342
Other	49	16	65
Small intestine	55	19	74
Peritoneum	75	37	112
Malignant neoplasm of lymph node	118	42	160
Parathyroid	1	2	3
Adrenal	11	3	14
Spleen	7	2	9
Soft tissue	72	26	98

CNS: Central nervous system

Table 2: Frequency of cancer types in female in the rural and urban area, a single clinical center frequency of new cancers in Kermanshah (from 2010 to 2019)

Tumor site	Frequency in rural (%)	Frequency in urban (%)
Lip/oral cavity/pharynx	4 (0.5)	16 (0.6)
Nasopharynx/paranasal	2 (0.2)	7 (0.3)
Esophagus	34 (4.2)	74 (2.9)
Stomach	48 (5.9)	156 (6.1)
Colorectal	79 (9.7)	248 (9.7)
liver	23 (2.8)	69 (2.7)
Gall bladder/ampulla vater	11 (1.3)	31 (1.2)
Pancreas	7 (0.9)	11 (0.4)
Lung	25 (3.1)	64 (2.5)
Other thoracic organ	17 (2.1)	36 (1.4)
bone	13 (1.6)	29 (1.1)
Melanoma other neoplasm of the skin	40 (4.9)	143 (5.6)
Breast	120 (14.7)	489 (19.2)
Cervix/uterus	41 (5)	157 (6.2)
Ovary	34 (4.2)	102 (4)
Kidney	30 (3.7)	92 (3.6)
Bladder	42 (5.1)	141 (5.5)
Brain/CNS	28 (3.4)	78 (3.1)
Thyroid	69 (8.5)	222 (8.7)
Lymphoma	22 (2.7)	46 (1.8)
Leukemia	34 (4.2)	97 (3.8)
Other	7 (0.9)	22 (0.9)
Small intestine	7 (0.9)	30 (1.2)
Peritoneum	25 (3.1)	41 (1.6)
Malignant neoplasm of lymph node	27 (3.3)	75 (2.9)
Parathyroid	2 (0.2)	1 (0)
Adrenal	3 (0.4)	7 (0.3)
Spleen	1 (0.1)	2 (0.1)
Soft tissue	15 (1.8)	31 (1.2)
Larynx	0	1 (0)

CNS: Central nervous system

Table 3: Frequency of cancer types in the male in rural and urban areas, a single clinical center frequency of new cancers in Kermanshah (from 2010 to 2019)

Tumor site	Frequency in urban (%)	Frequency in rural (%)
Lip/oral cavity/pharynx	19 (0.6)	14 (1.2)
Nasopharynx/paranasal	3 (0.1)	1 (0.1)
Esophagus	78 (2.5)	48 (4.3)
Stomach	309 (9.7)	141 (12.5)
colorectal	312 (9.8)	104 (9.3)
Liver	101 (3.2)	29 (2.6)
Gall bladder/ampulla vater	23 (0.7)	12 (1.1)
Pancreas	15 (0.5)	3 (0.3)
Larynx	8 (0.3)	3 (0.3)
Lung	172 (5.4)	49 (4.4)
Other/thoracic/organ	52 (1.6)	13 (1.2)
Bone	52 (1.6)	21 (1.9)
Melanoma other neoplasm of the skin	235 (7.4)	89 (7.9)
Prostate	359 (11.3)	122 (10.9)
Testis	45 (1.4)	19 (1.7)
Kidney	129 (4.1)	46 (4.1)
Bladder	598 (18.8)	193 (17.2)
Brain/CNS	97 (3.1)	45 (4)
Thyroid	80 (2.5)	31 (2.8)
Lymphoma	77 (2.4)	15 (1.3)
Leukemia	170 (5.3)	41 (3.6)
Other	27 (0.8)	9 (0.8)
Small intestine	25 (0.8)	12 (1.1)
Peritoneum	34 (1.1)	12 (1.1)
Malignant neoplasm of lymph node	43 (1.4)	15 (1.3)
Adrenal	4 (0.1)	0
Spleen	5 (0.2)	1 (0.1)
Soft tissue	41 (1.3)	11 (1)

CNS: Central nervous system

ampoules vater, bone, melanoma, testis, brain/nervous system, thyroid, and small intestine was higher in rural men than in urban men [Table 3].

A Chi-square test indicated a significant association between gender and frequency of cancer (χ^2 [31, n = 7721] = 0.485, $P < 0.05$). However, there was no significant difference between residence status with the frequency of cancer (χ^2 [31, n = 7671] = 0.075, P = 0.065). Independent sample t-test revealed that there was no significant difference between residence in urban and rural areas with age.

The most common registered cancers were bladder cancer (977 cases), colorectal (747 cases), breast (678 cases), stomach (660 cases), prostate (516 cases), melanoma (507 cases), thyroid (405 cases), leukemia (343 cases), lung (315 cases), and kidney (300 cases) [Figure 1]. The most common cancers in women were breast cancer (660 cases), colorectal (330 cases), thyroid (292 cases), uterine and cervical (222 cases), stomach (204 cases), melanoma (185 cases), bladder (186 cases), ovaries (144 cases), leukemia (131 cases), and kidney (123 cases) [Figures 2 and 3]. This case concerning men were bladder cancer (802), prostate (516), stomach (451), colorectal (418), melanoma (328), lung (223), leukemia (213), kidney (176), brain, and nervous system (143), esophagus (126), and liver (130) [Figures 2 and 4]. In nongender-related malignancies, bladder cancer was reported to be four times more common in men than in women, and among the ten most common cancers, lung, nervous, and esophageal malignancies were reported only in men.

The rarest cancers recorded in both sexes (<15 cases recorded during 2019–2010), were parathyroid cancer (3 cases), nasopharynx and paranasal (13 cases), spleen (9 cases), adrenal (13 cases), and larynx (13 cases). The incidence of the larynx and

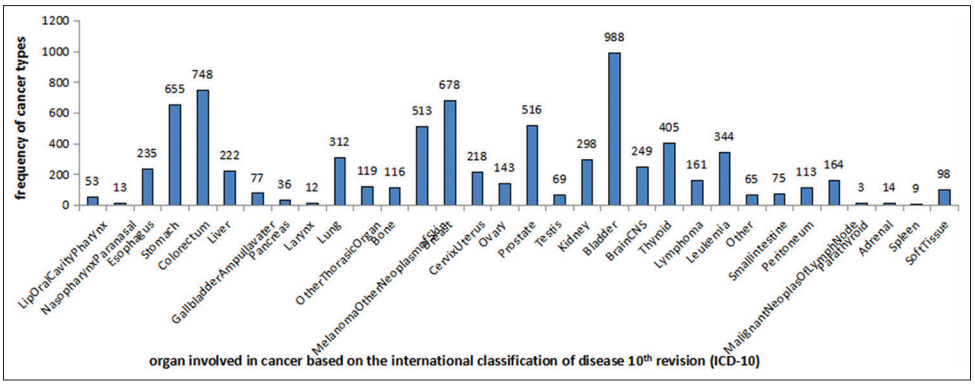

Figure 1: Frequency of cancer types by organ involved in cancer based on the international classification of disease 10th revision, a single clinical center frequency of new cancers in Kermansha (from 2010 to 2019)

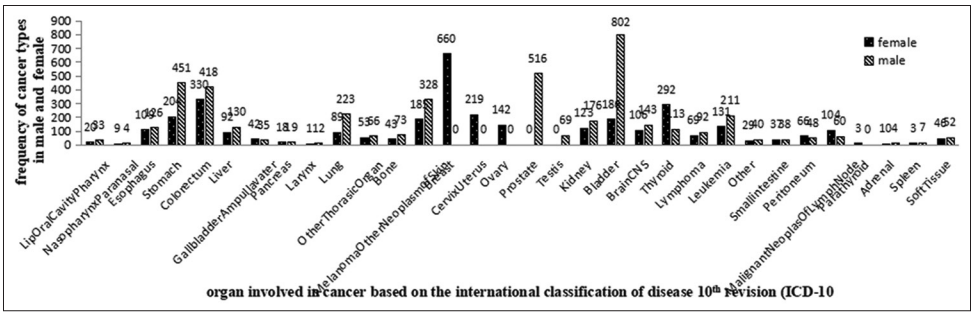

Figure 2: Frequency of cancer types in different sex by organ involved in cancer based on the International Classification of Disease 10th revision, a single clinical center frequency of new cancers in Kermanshah (from 2010 to 2019)

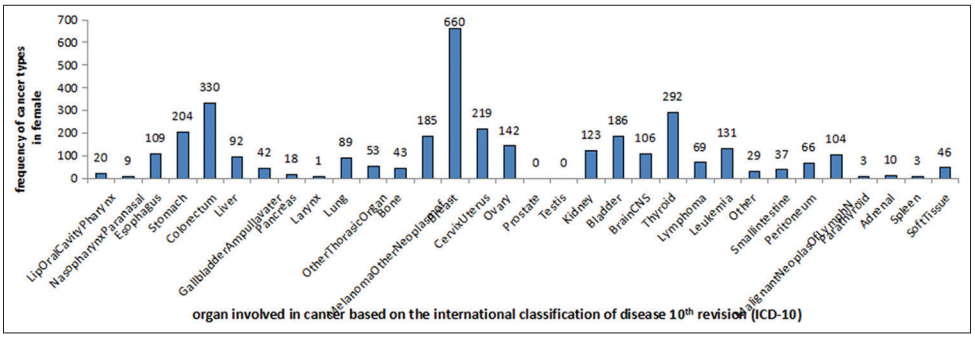

Figure 3: Frequency of cancer types in the female by organ involved in cancer based on the International Classification of Disease 10th revision, a single clinical center frequency of new cancers in Kermanshah (from 2010 to 2019)

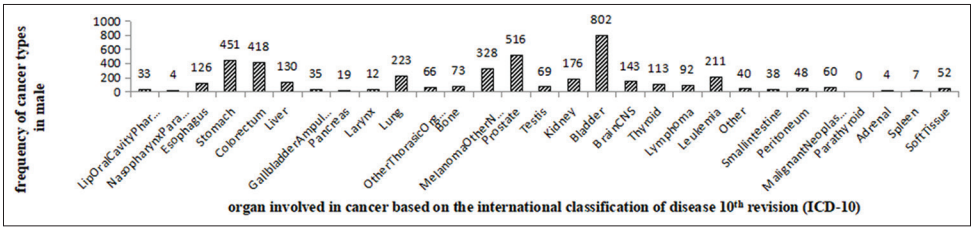

Figure 4: Frequency of cancer types in the male by organ involved in cancer based on the international classification of disease 10th revision, a single clinical center frequency of new cancers in Kermanshah (from 2010 to 2019)

spleen cancers was higher in men than in women (11 and 6 cases in men, respectively, compared to 1 and 3 cases in women), but the frequency of the parathyroid, nasopharynx, and adrenal cancers was higher in women.

Discussion

The findings of this study show that the frequency of various malignancies in men is higher than in women (56% vs. 44%) and this increase along with

aging so that the lowest frequency (31%) was recorded in those under 50 years of age, and the highest in those over 50 years of age (69%). Analyzing the different types of cancer in both sexes and different age groups, it was found that developing cancer in men was higher than in women, and the number of malignancies registered after the age of 50 in men is higher than in women. Furthermore, there was a significant difference between the two sexes concerning the mean age of the disease. The residence situation did not affect the frequency of cancers and the age of cancer, however, the type of common cancers was different. The percentage of breast, cervix, and stomach cancers in rural women was higher than in urban areas, and the percentage of cancers of the esophagus, stomach, gall bladder/ampule Vater, bone, and melanoma in rural men was higher than in urban areas. Meilleur *et al*. reported that "rural residence" is a potential risk factor for health-based inequalities.[9] On the other hand, the researchers found that rural patients had a worse prognosis and quality of life than urban patients. The problem of long distances to reach the desired cancer treatment centers and subsequent follow-ups are important barriers to achieve the early diagnosis and optimal treatment.[10] The procedure of patient care ranges from clinical decisions to medical diagnostic processes and choosing the treatment, monitoring, and clinical examination of the patient after treatment has been conducted with higher quality in urban hospitals than rural.[11,12]

Regarding the regional prevalence of cancers, the bladder, colorectal, and gastric cancers in rural areas were the most common cancer type, but parathyroid and splenic cancers were the least ones. In urban areas, bladder, colorectal, and breast were the most common, but the last ones were similar to the rural areas. Breast, colorectal, and thyroid cancers were the most common cancers in both areas in the female. Among the common cancers in urban and rural males, bladder, colorectal, prostate, and stomach cancers were more common. Nonetheless, about the percentage of different cancers, there were differences between men and women in both rural and urban areas.

According to a report on cancer incidence in Iran in 2014, 53.9% of all cases were male and 46.1% were female and the mean age was 64 and 56 in male and female, respectively. Furthermore, most cases of cancer occur in men over the age of 50 years.[5] Hence, all of these are consistent with the results of our study.

Bladder, colorectal, breast, stomach, and prostate were the most common malignancies in both genders in our study. According to globocan estimates of incidence and mortality worldwide for 36 cancers in 185 countries, prostate, lung, and liver cancers had more frequency in the world.[3] Concerning gender, the top cancers in men in our results were bladder, prostate, and stomach. The result in Globocan, 2018 project was lung, prostate, and liver. The last report of the incidence of cancers in Iran in 2014 mentioned that cancers of the stomach, prostate, colorectal, bladder, and lung are the most common cancers in men.[5] The results show that the most common cancers in men in our study were different from those in the whole country in terms of priorities. Interestingly, bladder cancer, which had a high frequency in our study, was not even among the three most common cancers.

The frequency of breast, colorectal, and thyroid cancers in women was higher. This result in the world was breast, cervix, and lung cancers,[3] and according to the incidence of cancers in Iran in 2014, the top five cancers in women are malignancies of breast, colorectal, stomach, thyroid, and leukemia.[5] Furthermore, in the other areas of Iran, studies reported that breast cancer in the female is more common.[13-15] However, the results of the Globocan, 2018 project regarding the prevalence of lung cancer in women in the world do not have conformable to the most common cancers in Iranian females.

Bladder cancer is the second most common malignancy of the genitourinary system worldwide.[16] The results of the present study showed that the male-to-female ratio is about 4.3–1. This ratio was 4–1 in Kerman province,[17] 6.9–1 in Babol[18] and this is <3 in India, Thailand, and America, while in Southern Europe, this ratio is more than six.[19] This indicates that an increased risk of bladder cancer in men is more than in women. The disparity between genders is proposed to be the result of differential exposure to carcinogens (i.e., tobacco and chemicals) as well as reflecting genetic, anatomical, hormonal, societal, and environmental factors. Inpatient length of stay, referral patterns for hematuria, and surgical outcomes suggest that the inferior quality of care for women might be an additional cause of gender inequalities.[20]

Based on our results, after bladder cancer, colorectal cancer (CRC) was the second most common (9.5%). The male-to-female ratio is about 1.26, and there is no significant difference between the two genders concerning CRC frequency. CRC is the third most common cancer after lung and breast cancer and the fourth leading cause of oncological death in the world, with an estimated 1.4 million cases and 700,000 deaths occurring in 2012.[21] The incidence of this cancer varies in the world. Nearly, 55% of these cases have occurred in highly developed countries, with the highest rates in Australia and New Zealand, and the lowest in the countries of West Africa.[22] According to cancer incidence in Iran in 2014, CRC is the top five common cancers in both genders which follows the pattern of the geographical area. The prevalence of CRC has been known as related to lifestyle (obesity, unhealthy diet, and lower physical activity).[5]

Our study suggested low frequency for parathyroid, nasopharynx and paranasal, spleen, adrenal, and larynx while in the last report of the incidence of tumor in Iran

2014 low incidence rate was for cervix uteri cancer[5] and that was not under our study.

The most common cancer in Kermanshah among two genders was bladder, CRC, and breast cancer. Roshandel *et al*. suggested the prevalence of cancer follows the pattern of the geographical area so that, esophagus, stomach, and lung cancers are more reported in North/North West of Iran and the breast, colorectal, skin, thyroid, bladder, prostate, and ovary cancers are more in central parts of Iran.[5] The results of this study did not accurately indicate common cancers in the West of the country.

Conclusion

According to our pathological data, the most common cancer in both genders in Kermanshah was bladder, colorectal, and breast cancer. The frequency of cancers, despite the differences in the percentage of cancers between the two sexes, did not follow the same pattern as other cities in Iran and the world. Therefore, our study confirmed that the prevalence of cancer may follow the pattern of the geographical area.

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Conflicts of interest

There are no conflicts of interest.

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