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Statistical Analysis of Different Cancers in Kermanshah Province

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Abstract: In this study, which was performed in 2007 a statistical investigation has been performed on the occurrence frequency, type of cancer and the relevance of this disease with age and sex in Kermanshah Province. Gathering the information of patient's medical reports between 2002 and 2006 and analyzing those using SPSS software showed that in this province after skin cancer, bladder cancer has the highest rate of occurrence unlike the world statistics. This analysis indicated that urban cancer rate is nearly twice rural rate and also showed that approximately 60% of infections are spotted among men and 40% among women. However in the age of 17 till 50, women are attacked more than men. The highest shown figures are in men at the age of 70 and women at the age of 60.

Key words: Cancer, SPSS software, Kermanshah

INTRODUCTION

Cancer, an abnormal cell division, is a major public health problem in all countries (Ghafoor *et al.*, 2002; Jemal *et al.*, 2007) and also in Iran. This disease is caused due to the alteration of natural cells. The disturbance of balance between the birth and death of cells that changes the appropriate number of cells in an organism can be a result of damages made to DNA which causes malignant genes to operate.

Development of a normal cell to a malignant cell is either due to activation of proliferation or cell death protector genes known as oncogenes, or as a consequence of inactivation of genes which should normally prevent reproduction namely the tumor suppressor genes (Hayflick, 2000). Cell growth control is affected by 5 different kinds of proteins which are protoncogenes and if altered to oncogenes could lead to cancer. These proteins consist of: growth factors, growth factor receptors and intra-cellular receptors, intra-cellular transducers, nuclear transcription factors and intra-nuclear tumor suppressor genes which control the cell cycle (Bertram, 2001; Sherr, 1996).

The goal of this study is the statistical investigation in occurrence frequency, type of cancer and the relevance of cancer with age and sex in Kermanshah Province. In order to reach this goal the information of patient's medical reports between 2002 and 2006 were gathered. Results of this study can explain cancer distribution in Kermanshah Province and these results can be used for comparative and statistical analysis for researcher not only in this region but in different parts of the world.

MATERIALS AND METHODS

Gathering record files related to cancer patients in Kermanshah Province: In order to study the distribution of various types of cancer in Kermanshah, the patient's record files with cancer background from 2002-2004 were collected from Kermanshah Province health care center.

Collecting available information from patient record files: These included age, gender, place of residence in the past 10 years and type of cancer diagnosed. These features were recorded from 4623 patients with cancer background in Kermanshah health care archive using available statistics. In all record files, only the four features mentioned above where common between all of them.

In this study, data analysis was performed by SPSS software. In order to facilitate software analysis, different features related to the disease were number coded.

RESULTS

Frequency percentages comparison of cancer in Kermanshah Province: From total of 4623 cancerous people which were referred to Kermanshah health care center, 1881 have been women with 40.7% relative frequency and 2742 were men with 59.3 relative frequencies.

In indexes related to gender, age and diagnosis, the maximum cancer occurrence rate was detected in male gender, age 70 and skin cancer, respectively. The data

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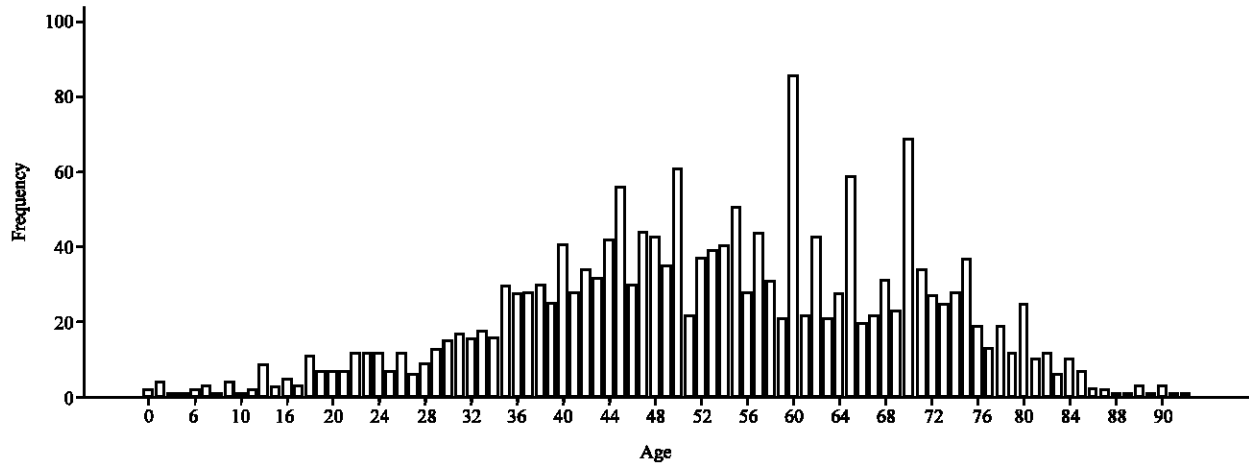
Fig. 1: Distribution of age frequency for cancerous people in Kermanshah Province
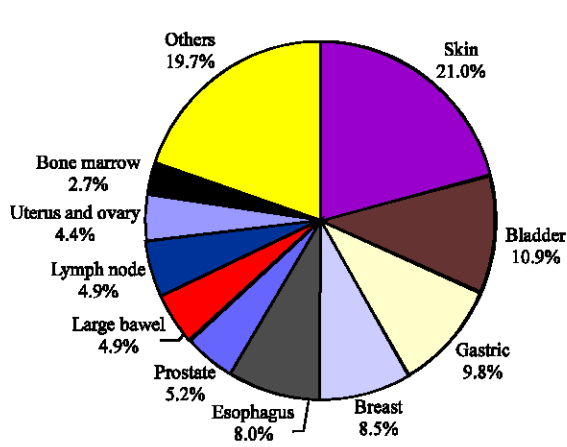

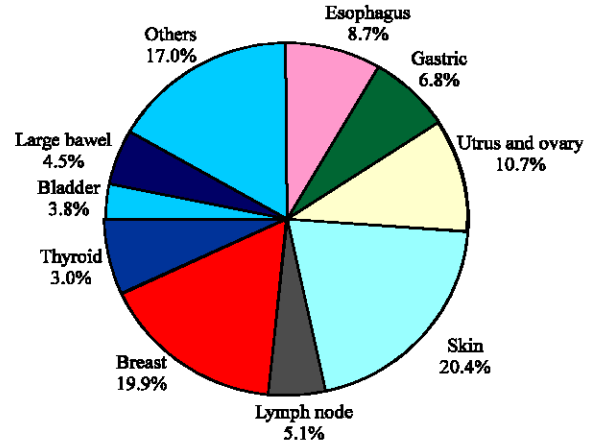Fig. 2: Frequency distribution of different cancer types in Kermanshah Province

Fig. 3: Frequency distribution of different cancer types in women of Kermanshah Province

analysis indicated that most patients were limited to ages between 50 and 80 with the mode of age 70 (Fig. 1). Figure 2 presents the obtained relative frequencies for various types of cancer in Kermanshah Province.

In comparison of cancer frequency in the counties of Kermanshah Province, from total cancers, 73.4% has been related to Kermanshah County (Table 1).

Frequency percentages comparison of cancer in women of Kermanshah Province: In indexes related to age and diagnosis, the maximum cancer occurrence rate was detected in age 60 and skin cancer, respectively. Most patients were limited to age 45-70 with mode in age 60. Figure 3 shows the obtained relative frequencies for types of cancer in women of Kermanshah Province.

Table 1: Frequency distribution of cancer affliction in counties of Kermanshah Province

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Kermanshah	2734	59.1	73.4	73.4
	Islam abad	306	6.6	8.2	81.6
	Dalaho	29	0.6	0.8	82.4
	Javanrod	71	1.5	1.9	84.3
	Pave	52	1.1	1.4	85.7
	Salase babajani	12	0.3	0.3	86.0
	Sarpol zahab	93	2.0	2.5	88.5
	Gilane gharb	68	1.5	1.8	90.4
	Ghasres shirin	11	0.2	0.3	90.7
	Songhor	83	1.8	2.2	92.9
	Sahne	71	1.5	1.9	94.8
	Kankavar	60	1.3	1.6	96.4
	Harsin	134	2.9	3.6	100.0
	Total	3724	80.6	100.0	
Missing	System	899	19.4		
Total		4623	100.0		

In comparison of cancer frequency in counties of the Province, from total cancers in women, 75.7% has been related to Kermanshah County (Table 2).
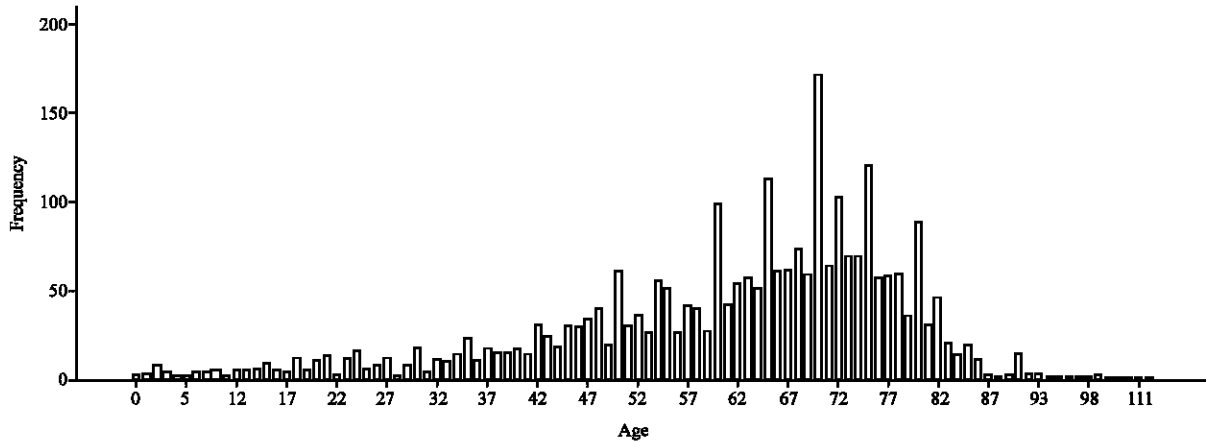
Fig. 4: Distribution of age frequency for cancerous men in Kermanshah Province

Table 2: Frequency distribution of cancer affliction in women of Kermanshah Province

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Kermanshah	1573	57.4	71.8	71.8
	Islam abad	180	6.6	8.2	80.0
	Dalaho	15	0.5	.7	80.7
	Javanrod	49	1.8	2.2	82.9
	Pave	34	1.2	1.6	84.5
	Salase babajani	9	0.3	.4	84.9
	Sarpol zahab	57	2.1	2.6	87.5
	Gilane gharb	41	1.5	1.9	89.4
	Ghasres Shirin	5	0.2	.2	89.6
	Songhor	58	2.1	2.6	92.2
	Sahne	43	1.6	2.0	94.2
	Kangavar	42	1.5	1.9	96.1
	Harsin	85	3.1	3.9	100.0
	Total	2191	79.9	100.0	
Missing	System	550	20.1		
Total		2741	100.0		

Table 3: Frequency distribution of cancer affliction in men of Kermanshah Province

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Kermanshah	1159	61.6	75.7	75.7
	Islam abad	126	6.7	8.2	83.9
	Dalaho	14	0.7	0.9	84.8
	Javanrod	22	1.2	1.4	86.3
	Pave	18	1.0	1.2	87.5
	Salase babajani	3	0.2	0.2	87.7
	Sarpol zahab	36	1.9	2.4	90.0
	Gilane gharb	27	1.4	1.8	91.8
	Ghasres shirin	6	0.3	0.4	92.2
	Songhor	25	1.3	1.6	93.8
	Sahne	28	1.5	1.8	95.6
	Kangavar	18	1.0	1.2	96.8
	Harsin	49	2.6	3.2	100.0
	Total	1531	81.4	100.0	
Missing	System	350	18.6		
Total		1881	100.0		

Frequency percentages comparison of cancer in men of Kermanshah Province: Figure 4 indicates that in indexes related to age and diagnosis, the maximum cancer occurrence rate was limited to age 60-80 and mode is in age 70. Figure 5 shows the obtained relative frequencies for types of cancer in men of Kermanshah Province.

In comparison of cancer frequency in counties of this Province, from total cancers 71.8% has been related to Kermanshah County (Table 3).

Frequency percentages comparison of cancer in cities of Kermanshah Province: In indexes related to age, gender and diagnosis, the maximum cancer occurrence rate in cities of Kermanshah Province has been obtained similar to the mean values in the whole Province.

From total of 4623 cancer suffering people living in urban areas of the province, 1358 were women with 42.7% relative frequency and 1824 were men with 57.3%
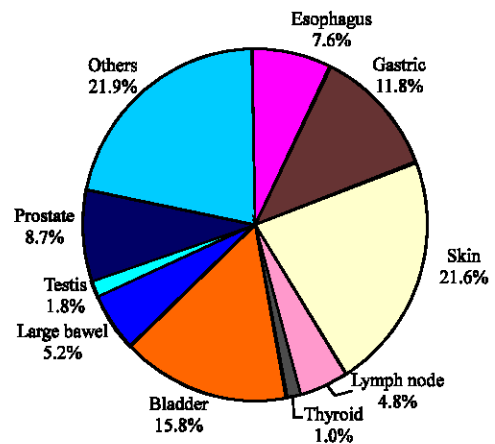

Fig. 5: Frequency distribution of different cancer types in men of Kermanshah Province

relative frequency. Figure 6 shows the frequency of age distribution for cancerous people in cities of Kermanshah
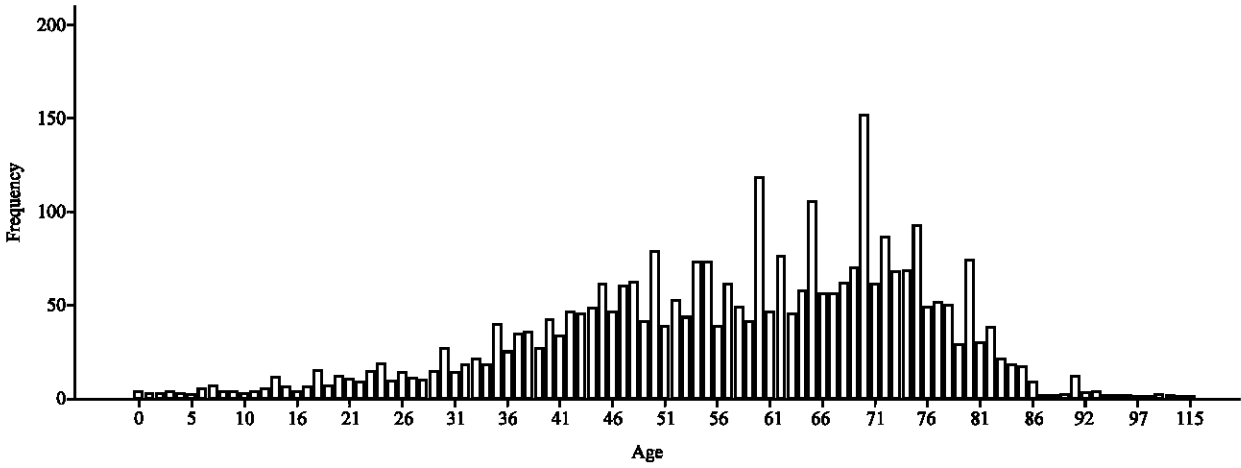
Fig. 6: Distribution of age frequency for cancerous people in Cities of Kermanshah Province
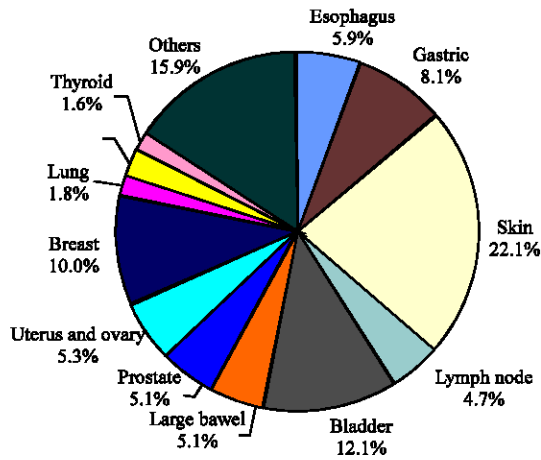

Fig. 7: Frequency distribution of different cancer types in cities of Kermanshah Province
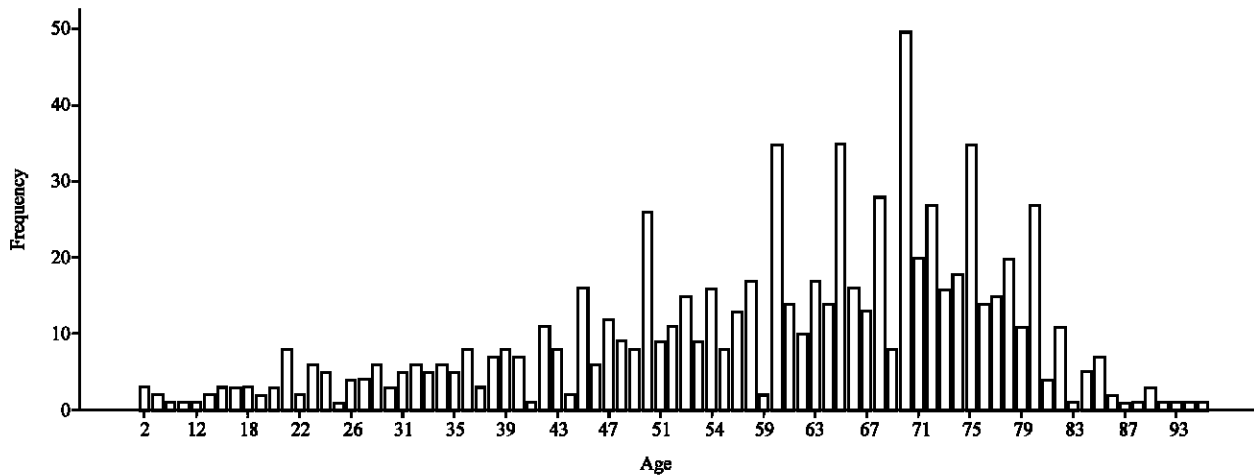

Fig. 8: Distribution of age frequency for cancerous people in villages of Kermanshah Province

Province which is similar to the age distribution obtained in the whole province. Moreover, Fig. 7 shows the relative frequency for types of cancer in Kermanshah cities.

Frequency percentages comparison of cancer in Kermanshah villages: From total of 808 cancer suffering villagers in the province, 275 were women with 34% relative frequency and 533 were men with 66% relative frequency.

In Fig. 8, the distribution of age frequency for cancerous villagers in Kermanshah Province is presented. Furthermore, Figure 9 shows the relative frequencies obtained for different types of cancer in villages of province.

Frequency percentages comparison of cancer in Kermanshah County: From total of 2734 cancer diagnosed people in Kermanshah County, 1161 were women with 42.5% relative frequency and 1573 were men with 57.5% frequency. Also, in Kermanshah County, cancer occurrence frequency has been obtained similar to the one in the whole Province. The obtained frequency for types of cancer in Kermanshah County can be obtained from Fig. 10.

Frequency percentages comparison of cancer in Kermanshah Province based on age classifications: In this stage of study, all of the people suffering from cancer were classified in 7 age group, consisting of 0-16.5 (group 1), 17-33.5 (group 2), 34-50.5 (group 3), 51-67.5 (group 4), 68-84.5 (group 5), 85-101.5 (group 6) and 102.118.5 (group 7) age classes.

In group 1 (ages 0 to 16.5), from total of 103 cancer sufferers, 37.9% were allocated to women and 62.1% to men. In this age class, cancers including lymph node, bone marrow, brain, kidney, bone and soft tissue and skin have the maximum percentages, respectively (Fig. 11).
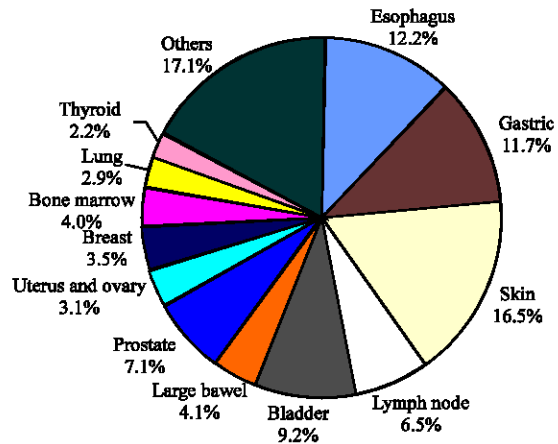

Fig. 9: Frequency distribution of different cancer types in villages of Kermanshah Province
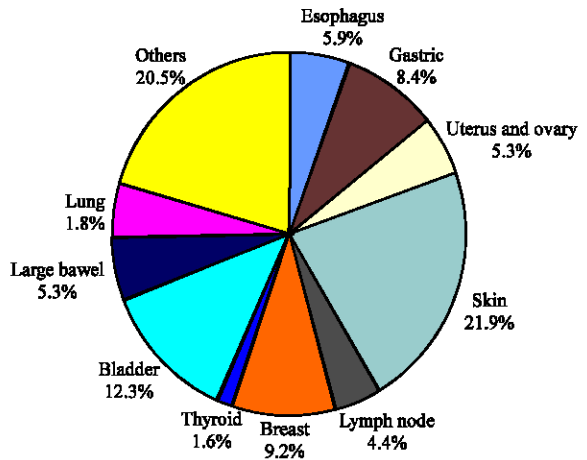

Fig. 10: Frequency distribution of different cancer types in Kermanshah County
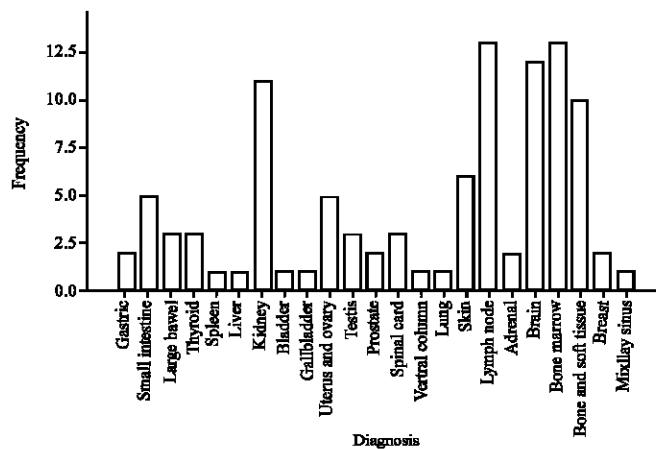

Fig. 11: Frequency distribution of different types of cancer in Kermanshah Province for age group 1 (from age 0 to 16.5)

In group 2 (ages 17 to 33.5), from total of 337 cancer suffering people, 54.6% were women and 45.4% were men. This displacement is due to the high frequency of breast cancer in women. In this group, cancers including lymph node, skin, breast, bone and soft tissue, thyroid, bone marrow and uterus and ovary have maximum frequency, respectively (Fig. 12).

In group 3 (ages 34 to 50.5), from total of 1017 people diagnosed with cancer suffering 59.6% were allocated to women and 40.4% to men. The increase of women occurrence frequency compared to men is related to the high rate of women exclusion cancers in this age class. In this group, cancers including breast, skin, uterus and ovary, large bowel and bladder have maximum frequency, respectively (Fig. 13).

In age group 4 (51 to 67.5) from total of 1487 cases, 41.4% were women and 58.6% were men. In this group, cancers including skin, bladder, gastric and esophagus have the highest rates, respectively (Fig. 14).

In group 5 (ages 68 to 84.5) 26% of the total of 1541 reported cases belonged to women and 74% to men. In this age class, cancers including skin, bladder, gastric, esophagus and prostate have the maximum percentages (Fig. 15).

In age group 6 (85 to 101.5), from total of 86 case, 25.6% were allocated to women and 74.4% to men. In this age class, cancers including skin, prostate, bladder and gastric have affected the most victims.

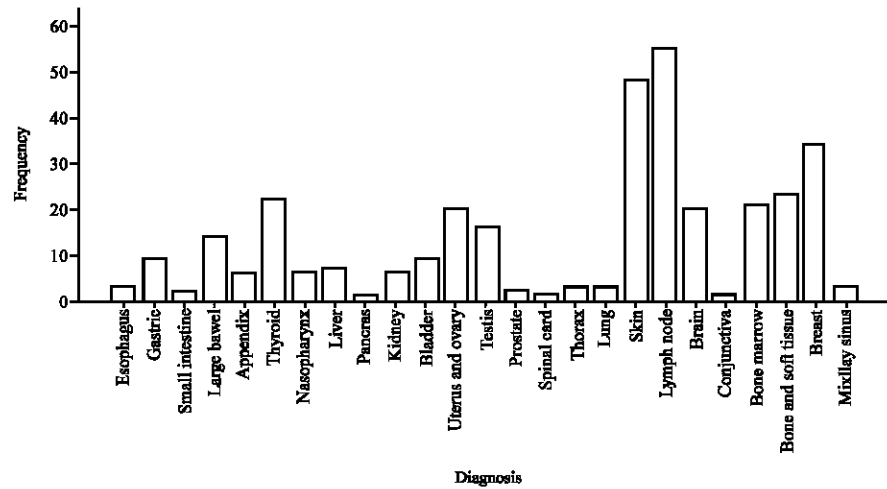
Fig. 12: Frequency distribution of different types of cancer in Kermanshah Province for age group 2 (from age 17 to 33.5)
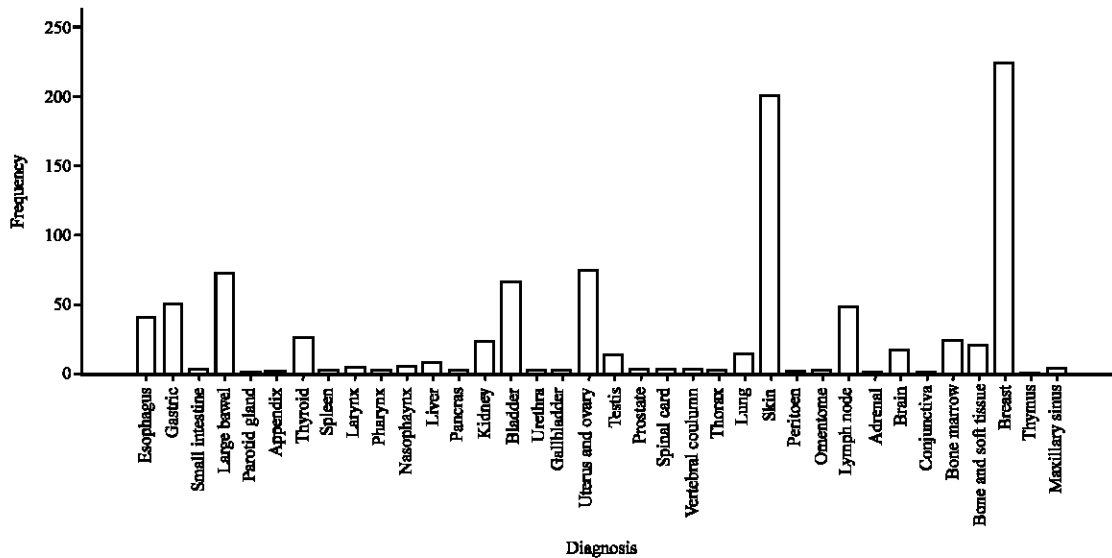
Fig. 13: Frequency distribution of different types of cancer in Kermanshah Province for age group 3 (from age 34 to 50.5)
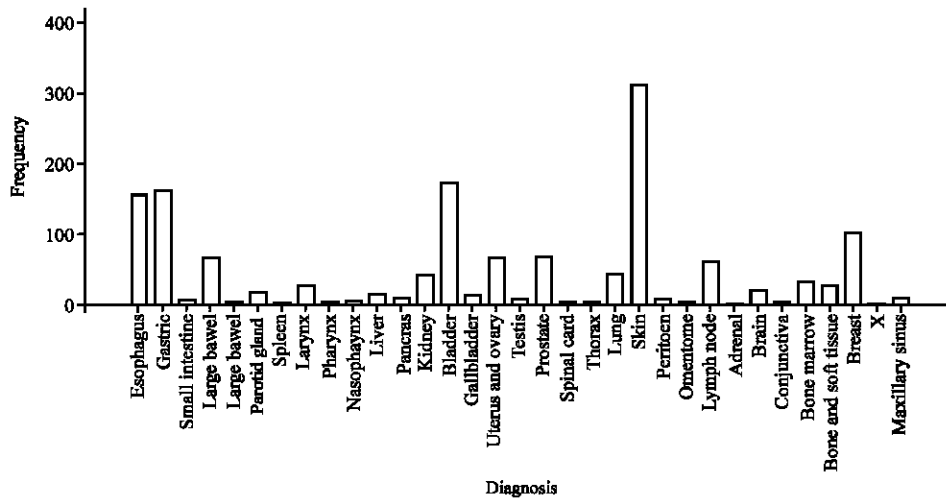
Fig. 14: Frequency distribution of different types of cancer in Kermanshah Province for age group 4 (from age 51 to 67.5)
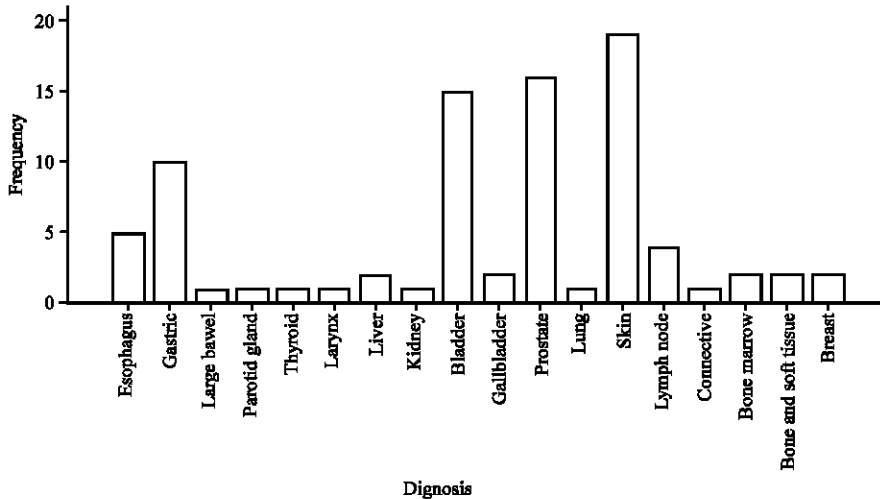
Fig. 15: Frequency distribution of different types of cancer in Kermanshah Province for age group 5 (from age 85 to 101.5)

In group 7 (ages 102 to 118.5), only 4 cases of suffering men were observed, two of which were reported bladder cancer, one prostate cancer and one nasopharynx cancer.

Hypothesis investigation

Binominal test: In order to investigate the presumption of a possible relation between gender and cancer affliction in Kermanshah Province a nonparametric test is used to compare the ratio of men suffering from cancer to ratio of women afflicted to cancer. In this test it is assumed that the cancer affliction ratio of men is equal to women in this Province. The results of this test show that meaningful scale which was calculated under the above mentioned assumption is equal to zero and indicates that the presumption of equal cancer affliction ratios for men and

Table 4: Binominal test for investigating the relation between gender and cancer affliction in Kermanshah Province

		Category	N	Observed Prop.	Test Prop.	Asymp. Sig. (2-tailed)
Gender	Group 1	Female	1883	0.41	0.50	0.000(a)
	Group 2	Male	2740	0.59		
	Total		4623	1.00		

a: Based on Z approximation

women in the Province is flunked out with $\alpha = 0.01$ scale (Table 4).

Using the above mentioned nonparametric test for investing the relation between lining in urban or rural areas and cancer affliction in Kermanshah Province, again the presumption of equal affliction ratios for cancer in urban and rural societies of the Province flunked in $\alpha = 0.01$ scale (Table 5).

Table 5: Binominal test for investigating the relation between living in urban or rural environments and cancer affliction in Kermanshah Province

		Category	N	Observed prop.	Test prop.	Asymp. sig. (2-tailed)	Exact sig. (2-tailed)
Address	Group 1	Urbane	808	0.20	0.50	0.000(a)	0.000(b)
	Group 2	Village	3183	0.80			
	Total		3991	1.00			

[a]Based on Z approximation, [b]Exact results are provided instead of Monte Carlo for this test

Table 6: Relation investigation between gender and type of cancer in Kermanshah Province

			Lymph node	Connective	Gum	Adrenal	Brain	Conjunctiva	Bone marrow	Bone and soft tissue	Breast
Gender	Female	Count	84.0	0.0	1.0	4.0	19.0	4.0	40.0	36.0	331.0
		Row %	5.2%	0.0%	0.1%	0.2%	1.2%	0.2%	2.5%	2.2%	20.3%
		Column %	42.0%	0.0%	100.0%	66.7%	28.4%	36.4%	36.7%	43.9%	95.4%
	Male	Count	116.0	1.0	0.0	2.0	48.0	7.0	69.0	46.0	16
		Row %	4.9%	0.0%	0.0%	0.1%	2.0%	0.3%	2.9%	2.0%	0.7%
		Column %	58.0%	100.0%	0.0%	33.3%	71.6%	63.6%	63.3%	56.1%	4.6%
Total		Count	200.0	1.0	1.0	6.0	67.0	11.0	109.0	82.0	347
		Row %	5.0%	0.0%	0.0%	0.2%	1.7%	0.3%	2.7%	2.1%	8.7%
		Column %	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

			Pharynx	Nasopharynx	Liver	Pancreas	Kidney	Bladder	Urethra	Gallbladder	Uterus and ovary
Gender	Female	Count	4.0	7.0	17.0	6.0	38.0	63.0	0.0	23.0	194.0
		Row %	0.2%	0.4%	1.0%	0.4%	2.3%	3.9%	0.0%	1.4%	11.9%
		Column %	44.4%	41.2%	35.4%	40.0%	38.0%	13.8%	0.0%	53.5%	100.0%
	Male	Count	5.0	10.0	31.0	9.0	62.0	395.0	3.0	20.0	0.0
		Row %	0.2%	0.4%	1.3%	0.4%	2.6%	16.8%	0.1%	0.9%	0.0%
		Column %	55.6%	58.8%	64.6%	60.0%	62.0%	86.2%	100.0%	46.5%	0.0%
Total		Count	9.0	17.0	48.0	15.0	100.0	458.0	3.0	43.0	194.0
		Row %	0.2%	0.4%	1.2%	0.4%	2.5%	11.5%	0.1%	1.1%	4.9%
		Column %	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

			Testis	Prostate	Spinal card	Vertebral column	Thorax	Lung	Skin	Peritoen	Omentome
Gender	Female	Count	0.0	0.0	4.0	3.0	6.0	23.0	326.0	7.0	6.0
		Row %	0.0%	0.0%	0.2%	0.2%	0.4%	1.4%	20.0%	0.4%	0.4%
		Column %	0.0%	0.0%	30.8%	50.0%	42.9%	28.4%	39.0%	35.0%	50.0%
	Male	Count	44.0	218.0	9	3.0	8.0	58.0	510.0	13.0	6.0
		Row %	1.9%	9.3%	0.4%	0.1%	0.3%	2.5%	21.7%	0.6%	0.3%
		Column %	100.0%	100.0%	69.2%	50.0%	57.1%	71.6%	61.0%	65.0%	50.0%
Total		Count	44.0	218.0	13	6.0	14.0	81.0	836.0	20.0	12.0
		Row %	1.1%	5.5%	0.3%	0.2%	0.4%	2.0%	21.0%	0.5%	0.3%
		Column %	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

			X	Thymus	Maxillary sinus	Total
Gender	Female	Count	0.0	1.0	12.0	1630.0
		Row %	0.0%	0.1%	0.7%	100.0%
		Column %	0.0%	100.0%	54.5%	40.9%
	Male	Count	2.0	0.0	10.0	2352.0
		Row %	0.1%	0.0%	0.4%	100.0%
		Column %	100.0%	0.0%	45.5%	59.1%
Total		Count	2.0	1.0	22.0	3982.0
		Row %	0.1%	0.0%	0.6%	100.0%
		Column %	100.0%	100.0%	100.0%	100.0%

Independent test: To study the relativity between gender and type of cancer in cancerous patients, Table 6 was used to facilitate this analysis. In Table 6, lines and columns demonstrate gender and type of cancer, respectively. Therefore, the cancer occurrence percentage can be easily observed in each type of cancer for men and women. Using the chi-square test, independent presumption of these factors has been tested (Table 7). The results show that this presumption is flunked in $\alpha = 0.01$ scale and this indicates that type of cancer is relevant to gender. Due to fact that the results obtained in Table 7 might be highly affected by specific cancers in different genders (in women: breast, uterus and ovary cancers and in men: prostate cancer) and in order to eliminate this possibility, this test is repeated once more without the aforementioned specific cancers. Also, the results of this test show that gender is related to type of cancer in both genders (Table 8).

Moreover, the relation between age and gender was investigated in cancerous patients. For this purpose Table 9 was drawn in which lines and columns indicate gender and age classes (7 groups), respectively. Thus, the cancer occurrence percentage can be easily observed in both genders for each age class.

By applying the chi-square test, independent presumption of these factors have been tested (Table 10). The results show that this presumption is flunked in $\alpha = 0.01$ scale and this indicates that in one specific gender cancer tends to occur in specific age classes. Also, this table demonstrates that in age classes 2 and 3, the number of woman patients is more than men and in the other age classes men patients are more than women. The highest frequency of woman patients is shown in age class 3 and in men in age class 5.

At the next step, the relation between ages, gender and living environment (urban or rural) was surveyed for patients in the Province using Table 11 and Chi-square test (Table 12). The results of this test prove that in $\alpha = 0.01$ scale these three parameters are related to one another. Also, this Table 12 shows that frequency of urban and rural woman patients in age classes 2 and 3 are more than men and in the other age classes men are more than women. The frequency of woman patients in cities and in villages has the highest rates in age classes 3 and 4, respectively. The frequency of man patients in cities and villages is highest in age class 5 (Fig. 16, 17).

Another aim of this study was to investigate the relation between ages and living in urban or rural environments and also type of cancer which is shown in Table 12. The results of this test according to Table 13, again confirms the occurrence of relation in $\alpha = 0.01$ scale (Fig. 18, 19).

Investigation of survival test, density test and hazard rate test for men in Kermanshah Province: In addition to previous tests, in this study other tests including survival test, density test (momentary affliction) and hazard rate test were used to further analysis the congregated data. According to the survival test (Fig. 20) more than 90% of cancerous men in the Province were not afflicted until the age of 45, however the probability of being affected to cancer is decreased after the age of 60.

The density test diagram in Fig. 21 demonstrates that momentary affliction to cancer for man patients is remarkably increased from age 40 to 85. According to the hazard rate test, the hazard rate of affliction to cancer in men is highly decreased until the age of 60 and further on is rapidly increased until age 100 and again shows a sudden decrease after age 100 (Fig. 22).

Investigation of survival test, density test and hazard rate test for women in Kermanshah Province: Figure 23 is the survival test diagram for women in the Province.

Table 7: Chi-square test for investigating the relation between gender and type of cancer in Kermanshah Province

Statistical test	Values	df	Asymp. Sig. (2-sided)
Pearson Chi-square	1123.696	38	0.000
Continuity correction			
Likelihood ratio	1366.544	38	0.000
Linear-by-linear association	128.962	1	0.000
N of valid cases	3982.000		

Table 8: Chi-square test for similar cancers in men and women

Statistical test	Values	df	Asymp. Sig. (2-sided)
Pearson Chi-square	227.092(a)	32	0.000
Continuity correction			
Likelihood ratio	242.011	32	0.000
Linear-by-linear association	2.729	1	0.099
N of valid cases	3720.000		

a: 17 cells (25.8%) have expected count less than 5. The minimum expected count is 0.35

Table 9: Relation analysis between age and gender in cancerous patients in Kermanshah Province

			Age				Total			
			0-16.5	17-33.5	34-50.5	51-67.5	68-84.5	85-101.5	102-118.5	1.00
Gender	Female	Count	35.0	159.0	538.0	533.0	348.0	16.0	0.0	1629.0
		Row (%)	2.1 (%)	9.8 (%)	33.0 (%)	32.7 (%)	21.4 (%)	1.0 (%)	0.0 (%)	100.0 (%)
		Column (%)	38.9 (%)	53.9 (%)	60.4 (%)	41.4 (%)	26.1 (%)	21.9 (%)	0.0 (%)	41.0 (%)
	Male	Count	55.0	136.0	353.0	754.0	986.0	57.0	4.0	2345.0
		Row (%)	2.3 (%)	5.8 (%)	15.1 (%)	32.2 (%)	42.0 (%)	2.4 (%)	0.2 (%)	100.0 (%)
		Column (%)	61.1 (%)	46.1 (%)	39.6 (%)	58.6 (%)	73.9 (%)	78.1 (%)	100.0 (%)	59.0 (%)
Total		Count	90.0	295.0	891.0	1287.0	1334.0	73.0	4.0	3974
		Row (%)	2.3 (%)	7.4 (%)	22.4 (%)	32.4 (%)	33.6 (%)	1.8 (%)	0.1 (%)	100.0 (%)
		Column (%)	100.0 (%)	100.0 (%)	100.0 (%)	100.0 (%)	100.0 (%)	100.0 (%)	100.0 (%)	100.0 (%)

Table 10: Chi-square test for investigating the relation between age and gender in cancerous patients in Kermanshah Province

Statistical test	Values	df	Asymp. Sig. (2-sided)
Pearson Chi-square	295.342	6	0.000
Continuity correction			
Likelihood ratio	301.346	6	0.000
Linear-by-linear association	205.891	1	0.000
N of valid cases	3974.000		

Table 11: Relation investigation between age, gender and living in urban or rural envirouments in cancerous patients in Kermanshah Province

				Age							
Address				1.00	2.00	3.00	4.00	5.00	6.00	7.00	Total
Urbane	Gender	Female	Count	29.0	124.0	461.0	448.0	281.0	11.0	0.0	1354
			Row (%)	2.1 (%)	9.2 (%)	34.0 (%)	33.1 (%)	20.8 (%)	0.8 (%)	0.0 (%)	100.0 (%)
			Column (%)	39.2 (%)	53.4 (%)	61.6 (%)	43.4 (%)	27.4 (%)	19.3 (%)	0.0 (%)	42.7 (%)
		Male	Count	45.0	108.0	287.0	585	743.0	46	2.0	1816.0
			Row (%)	2.5 (%)	5.9 (%)	15.8 (%)	32.2 (%)	40.9 (%)	2.5 (%)	0.1 (%)	100.0 (%)
			Column (%)	60.8 (%)	46.6 (%)	38.4 (%)	56.6 (%)	72.6 (%)	80.7 (%)	100.0 (%)	57.3 (%)
	Total		Count	74	232.0	748.0	1033.0	1024.0	57.0	2.0	3170.0
			Row (%)	2.3 (%)	7.3 (%)	23.6 (%)	32.6 (%)	32.3 (%)	1.8 (%)	0.1 (%)	100.0 (%)
			Column (%)	100.0 (%)	100.0 (%)	100.0 (%)	100.0 (%)	100.0 (%)	100.0 (%)	100.0 (%)	100.0 (%)
Village	Gender	Female	Count	6.0	35.0	77.0	85.0	67.0	5.0	0.0	275.0
			Row (%)	2.2 (%)	12.7 (%)	28.0 (%)	30.9 (%)	24.4 (%)	1.8 (%)	0.0%	100.0 (%)
			Column (%)	37.5 (%)	55.6 (%)	53.8 (%)	33.5 (%)	21.6 (%)	31.3 (%)	0.0%	34.2 (%)
		Male	Count	10.0	28.0	66.0	169	243	11.0	2.0	529
			Row (%)	1.9 (%)	5.3%	12.5 (%)	31.9 (%)	45.9 (%)	2.1 (%)	0.4%	100.0 (%)
			Column (%)	62.5 (%)	44.4 (%)	46.2 (%)	66.5 (%)	78.4 (%)	68.8 (%)	100.0 (%)	65.8 (%)
	Total		Count	16	63.0	143	254.0	310	16.0	2.0	804
			Row (%)	2.0 (%)	7.8 (%)	17.8 (%)	31.6 (%)	38.6 (%)	2.0 (%)	0.2 (%)	100.0 (%)
			Column (%)	100.0 (%)	100.0 (%)	100.0 (%)	100.0 (%)	100.0 (%)	100.0 (%)	100.0 (%)	100.0 (%)

Table 12: Chi-square test for investigating the relation between age, gender and living in urban or rural envirouments in cancerous patients in Kermanshah Province

Address		Values	df	Asymp. Sig. (2-sided)
Urbane	Pearson Chi-square continuity correction	232.752(a)	6	0.000
	Likelihood ratio	238.124	6	0.000
	Linear-by-linear association	155.262	1	0.000
	N of valid cases	3170.000		
Village	Pearson Chi-square continuity correction	60.356(b)	6	0.000
	Likelihood ratio	60.523	6	0.000
	Linear-by-linear association	46.406	1	0.000
	N of valid cases	804.000		

a: 2 cells (14.3%) have expected count less than 5. The minimum expected count is 0.85. b: 2 cells (14.3%) have expected count less than 5. The minimum expected count is 0.68

Table 13: Investigation of relation between gender, living in urban or rural environments and type of cancer in cancerous patients in Kermanshah Province

				Diagnosis			
Address				Esophagus	Gastric	Small intestine	Large bawel
Urbane	Gender	Female	Count	85.0	82.0	3.0	59.0
			Row %	6.3%	6.0%	0.2%	4.3%
			Column %	45.5%	31.9%	25.0%	36.6%
		Male	Count	44102.0	175.0	9.0	102.0
			Row %	5.6%	9.6%	0.5%	5.6%
			Column %	54.5%	58.1%	75.0%	63.4%
	Total		Count	187.0	257.0	12.0	161.0
			Row %	5.9%	8.1%	0.4%	5.1%
			Column %	100.0%	100.0%	100.0%	100.0%
Village	Gender	Female	Count	41.0	22.0	2.0	13.0
			Row %	15.0%	8.1%	0.7%	4.8%
			Column %	41.8%	23.4%	50.0%	39.4%
		Male	Count	57.0	72.0	2.0	20.0
			Row %	10.7%	13.5%	0.4%	3.8%
			Column %	58.2%	76.6%	50.0%	60.6%
	Total		Count	98.0	94.0	4.0	33.0
			Row %	12.2%	11.7%	0.5%	4.1%
			Column %	100.0%	100.0%	100.0%	100.0%
				Diagnosis			
Address				Larynx	Pharynx	Nasopharynx	Liver
Urbane	Gender	Female	Count	5.0	3.0	6.0	10.0
			Row %	0.4%	0.2%	0.4%	0.7%
			Column %	10.2%	50.0%	40.0%	34.5%
		Male	Count	44.0	3.0	9.0	19.0
			Row %	2.4%	0.2%	0.5%	1.0%
			Column %	89.8%	50.0%	60.0%	65.5%
	Total		Count	49.0	6.0	15.0	29.0
			Row %	1.5%	0.2%	0.5%	0.9%
			Column %	100.0%	100.0%	100.0%	100.0%

Table 13: Continued

Address				Larynx	Pharynx	Nasopharynx	Liver
				Diagnosis			
Village	Gender	Female	Count	3.0	1.0	1.0	7.0
			Row %	1.1%	0.4%	0.4%	2.6%
			Column %	23.1%	33.3%	50.0%	36.8%
		Male	Count	10.0	2.0	1.0	12.0
			Row %	1.9%	0.4%	0.2%	2.3%
			Column %	76.9%	66.7%	50.0%	63.2%
	Total		Count	13.0	3.0	2.0	19.0
			Row %	1.6%	0.4%	0.2%	2.4%
			Column %	100.0%	100.0%	100.0%	100.0%

Address				Parotid gland	Appendix	Thyroid	Spleen
				Diagnosis			
Urbane	Gender	Female	Count	2.0	5.0	36.0	1.0
			Row %	0.1%	0.4%	2.7%	0.1%
			Column %	33.3%	71.4%	69.2%	16.7%
		Male	Count	4.0	2.0	16.0	5.0
			Row %	0.2%	0.1%	0.9%	0.3%
			Column %	66.7%	28.6%	30.8%	83.3%
	Total		Count	6.0	7.0	52.0	6.0
			Row %	0.2%	0.2%	1.6%	0.2%
			Column %	100.0%	100.0%	100.0%	100.0%
Village	Gender	Female	Count	0.0	0.0	12.0	0.0
			Row %	0.0%	0.0%	4.4%	0.0%
			Column %	0.0%	0.0%	66.7%	0.0%
		Male	Count	3.0	1.0	6.0	1.0
			Row %	0.6%	0.2%	1.1%	0.2%
			Column %	100.0%	100.0%	33.3%	100.0%
	Total		Count	3.0	1.0	18.0	1.0
			Row %	0.4%	0.1%	2.2%	0.1%
			Column %	100.0%	100.0%	100.0%	100.0%

Address				Pancreas	Kidney	Bladder	Urethra
				Diagnosis			
Urbane	Gender	Female	Count	6.0	30.0	59.0	0.0
			Row %	0.4%	2.2%	4.3%	0.0%
			Column %	54.5%	37.5%	15.4%	0.0%
		Male	Count	5.0	50.0	325.0	3.0
			Row %	0.3%	2.7%	17.9%	0.2%
			Column %	45.5%	62.5%	84.6%	100.0%
	Total		Count	11.0	80.0	384.0	3.0
			Row %	0.3%	2.5%	12.1%	0.1%
			Column %	100.0%	100.0%	100.0%	100.0%
Village	Gender	Female	Count	0.0	8.0	4.0	
			Row %	0.0%	2.9%	1.5%	
			Column %	0.0%	40.0%	5.4%	
		Male	Count	4.0	12.0	70.0	
			Row %	0.8%	2.3%	13.2%	
			Column %	100.0%	60.0%	94.6%	
	Total		Count	4.0	20.0	74.0	
			Row %	0.5%	2.5%	9.2%	
			Column %	100.0%	100.0%	100.0%	

Address				Gallbladder	Uterus and ovary	Testis	Prostate
				Diagnosis			
Urbane	Gender	Female	Count	19.0	169.0	0.0	0.0
			Row %	14.0%	12.5	0.0	0.0%
			Column %	52.8%	100.0%	0.0%	0.0%
		Male	Count	17.0	0.0	31.0	161.0
			Row %	0.9%	0.0%	1.7%	8.8%
			Column %	47.2%	0.0%	100.0%	100.0%
	Total		Count	36.0	169.0	31.0	161.0
			Row %	1.1%	5.3%	1.0%	5.1%
			Column %	100.0%	100.0%	100.0%	100.0%

Table 13: Continued

				Diagnosis			
				Gallbladder	Uterus and ovary	Testis	Prostate
Address							
Village	Gender	Female	Count	4.0	25.0	0.0	0.0
			Row %	1.5%	9.2%	0.0%	0.0%
			Column %	57.1%	100.0%	0.0%	0.0%
		male	Count	3.0	0.0	13.0	57.0
			Row %	0.68%	0.0%	2.4%	10.7%
			Column %	42.9%	0.0%	100.0%	100.0%
	Total		Count	7.0	25.0	13.0	57.0
			Row %	0.9%	3.1%	1.6%	7.1%
			Column %	100.0%	100.0%	100.0%	100.0%

				Diagnosis			
				Spinal card	Vertebral column	Thorax	Lung
Address							
Urbane	Gender	Female	Count	4.0	3.0	5.0	20.0
			Row %	0.3%	0.2%	0.4%	1.5%
			Column %	30.8%	60.0%	41.7%	34.5%
		Male	Count	9.0	2.0	7.0	38.0
			Row %	0.5%	0.1%	0.4%	2.1%
			Column %	69.2%	40.0%	58.3%	65.5%
	Total		Count	13.0	5.0	12.0	58.0
			Row %	0.4%	0.2%	0.4%	1.8%
			Column %	100.0%	100.0%	100.0%	100.0%
Village	Gender	Female	Count		0.0	1.0	3.0
			Row %		0.0%	0.4%	1.1%
			Column %		0.0%	50.0%	13.0%
		Male	Count		1.0	1.0	20.0
			Row %		0.2%	0.2%	3.8%
			Column %		100.0%	50.0%	87.0%
	Total		Count		1.0	2.0	923.0
			Row %		0.1%	0.2%	2.0%
			Column %		100.0%	100.0%	100.0%

				Diagnosis			
				Skin	Peritoen	Omentome	Lymph node
Address							
Urbane	Gender	Female	Count	284.0	6.0	6.0	63.0
			Row %	20.9%	0.4%	0.4%	4.6%
			Column %	40.4%	33.3%	54.5%	42.6%
		Male	Count	419.0	12.0	5.0	85.0
			Row %	23.0%	0.7%	0.3%	4.7%
			Column %	59.6%	66.7%	45.5%	57.4%
	Total		Count	703.0	18.0	11.0	148.0
			Row %	22.1%	0.6%	0.3%	4.7%
			Column %	100.0%	100.0%	100.0%	100.0%
Village	Gender	Female	Count	42.0	1.0	0.0	21.0
			Row %	15.4%	0.4%	0.0%	7.7%
			Column %	31.6%	50.0%	0.0%	40.4%
		Male	Count	91.0	1.0	1.0	31.0
			Row %	17.1%	0.2%	0.2%	5.8%
			Column %	68.40%	50.0%	100.0%	59.6%
	Total		Count	133.0	2.0	1.0	52.0
			Row %	16.5%	0.2%	0.1%	6.5%
			Column %	100.0%	100.0%	100.0%	100.0%

				Diagnosis			
				Counective	Gum	Adrenal	Brain
Address							
Urbane	Gender	Female	Count	0.0	1.0	4.0	14.0
			Row %	0.0%	0.1%	0.3%	1.0%
			Column %	0.0%	100.0%	66.7%	25.9%
		Male	Count	1.0	0.0	2.0	40.0
			Row %	0.1%	0.0%	0.1%	2.2%
			Column %	100.0%	0.07%	33.3%	74.1%
	Total		Count	1.0	1.0	6.0	54.0
			Row %	0.0%	0.0%	0.2%	1.7%
			Column %	100.0%	100.0%	100.0%	100.0%

Table 13: Continued

Address				Connective	Gum	Adrenal	Brain
Village	Gender	Female	Count				5.0
			Row %				1.8%
			Column %				38.5%
		Male	Count				8.0
			Row %				1.5%
			Column %				61.5%
	Total		Count				13.0
			Row %				1.6%
			Column %				100.0%

Diagnosis

Address				conjnnctive	Bone marrow	Bone and soft tissue	breast
Urbane	Gender	Female	Count	2.0	27.0	23.0	305.0
			Row %	0.1%	2.0%	1.7%	22.5%
			Column %	25.0%	35.1%	36.5%	95.6%
		Male	Count	6.0	50.0	40.0	14.0
			Row %	0.3%	2.7%	2.2%	0.8%
			Column %	75.0%	64.9%	63.5%	4.4%
	Total		Count	8.0	77.0	63.0	319.0
			Row %	0.3%	2.4%	2.0%	10.0%
			Column %	100.0%	100.0%	100.0%	100.0%
Village	Gender	Female	Count	2.0	13.0	13.0	26.0
			Row %	0.7%	4.8%	4.8%	9.5%
			Column %	66.7%	40.6%	68.4%	92.9%
		Male	Count	1.0	19.0	6.0	2.0
			Row %	0.2%	3.6%	1.1%	0.4%
			Column %	33.3%	59.4%	31.6%	7.1%
	Total		Count	3.0	32.0	19.0	28.0
			Row %	0.4%	4.0%	2.4%	3.5%
			Column %	100.0%	100.0%	100.0%	100.0%

Diagnosis

Address				x	Thymus	Maxillary sinus	Total
Urbane	Gender	Female	Count	0.0	1.0	9.0	1357.0
			Row %	0.0%	0.1%	0.7%	100.0%
			Column %	0.0%	100.0%	56.3%	42.7%
		Male	Count	1.0	0.0	7.0	1820.0
			Row %	0.1%	0.0%	0.4%	100.0%
			Column %	100.0%	0.0%	43.8%	57.3%
	Total		Count	1.0	1.0	16.0	3177.0
			Row %	0.0%	0.0%	0.5%	100.0%
			Column %	100.0%	100.0%	100.0%	100.0%
Village	Gender	Female	Count	0.0		3.0	273.0
			Row %	0.0%		1.1%	100.0%
			Column %	0.0%		50.0%	33.9%
		Male	Count	1.0		3.0	532.0
			Row %	0.2%		0.6%	100.0%
			Column %	100.0%		50.0%	66.1%
	Total		Count	1.0		6.0	805.0
			Row %	0.1%		0.7%	100.0%
			Column %	100.0%		100.0%	100.0%

According to the diagram, more than 90% of women patients are not afflicted to cancer until the age of 30, however cancer suffering in women is highly increased after the age of 45. Chi square test for investigating the relation between gender is shown in Table 14.

In the density diagram for women, it is observed that momentary affliction to cancer for woman patients is remarkably increased from age 30 to age 85 and again is much decreased after age 85 (Fig. 24). Regarding the hazard rate for women, it was indicated that hazard rate is low until age 60, but increases from age 60 to age 90 and this increase rate is lower than men. Further on, after age 90, hazard rate is vastly decreased (Fig. 25).

Comparison of statistic results from the point of view of types of cancer distribution in Kermanshah with international references: In this study it is indicated that in Kermanshah the highest cancer occurrence rate belong to skin cancer which is conventional to international references. In the United States, nonmelanoma skin cancer (NMSC) is the most prevalent cancer. From total of NMSC, 80% is Basal Cell Carcinoma (BCC) and 20% is related to Squamous Cell Carcinoma (SCC) (Kasper *et al.*, 2005; Jemal *et al.*, 2007).

According to the international urology references, bladder cancer occurrence in men is three times more than in women. After prostate cancer, lung cancer and colorectal cancer, this type of cancer in men (without considering skin cancer) is the fourth prevalent cancer with 6.6% of the cases. Bladder cancer in women is estimated to make up 2.4% of total cancers. Direct relation exists between the bladder cancer and age and it is rare in people younger than age 50. The average diagnosis time age for both genders is age 70 (Campbell *et al.*, 1998; Tanagho and Aninch, 2004). According to the results obtained from this study in Kermanshah Province, bladder cancer in men is approximately four times more than women. After skin cancer, this cancer in men is the secondary prevalence cancer and its prevalence is 15.8% of total cancers and bladder cancer in women is approximately 3.8% of total cancers.

Due to high frequency of bladder cancer (specially in women) in Kermanshah, some risk factors related to bladder cancer have been presumed to be smoking, chronic cystitis and other infections, γ-ray radiation to hipbone, cyclophosphamide and aromatic dyes.
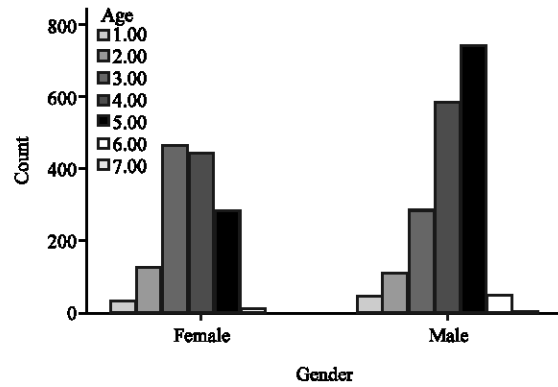
Fig. 16: Frequency diagram for relation between age, gender and urban living environment in cancerous patients in Kermanshah Province
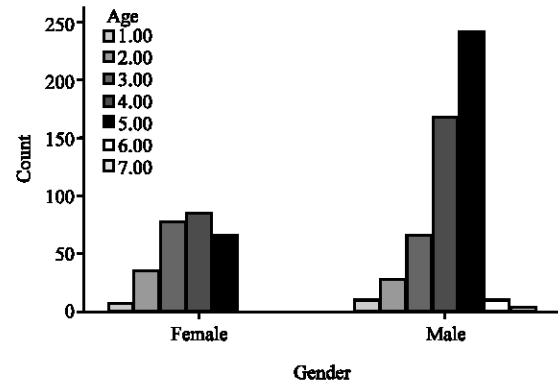
Fig. 17: Frequency diagram for relation between age, gender and rural living environment in cancerous patients in Kermanshah Province
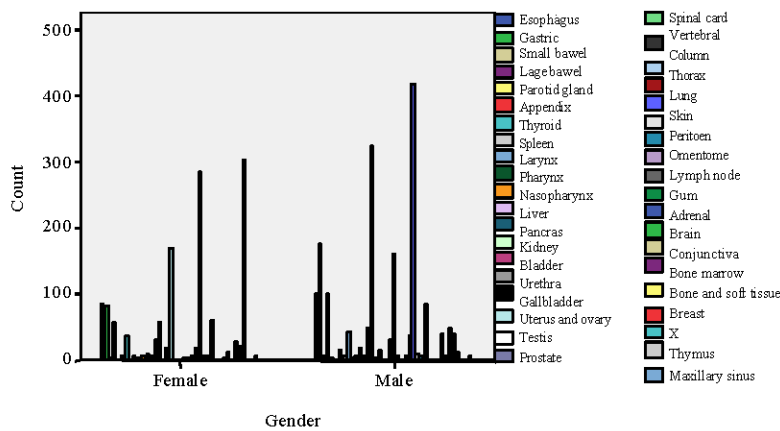

Fig. 18: Frequency diagram for relation between gender, type of cancer and urban living environment in cancerous patients in Kermanshah Province
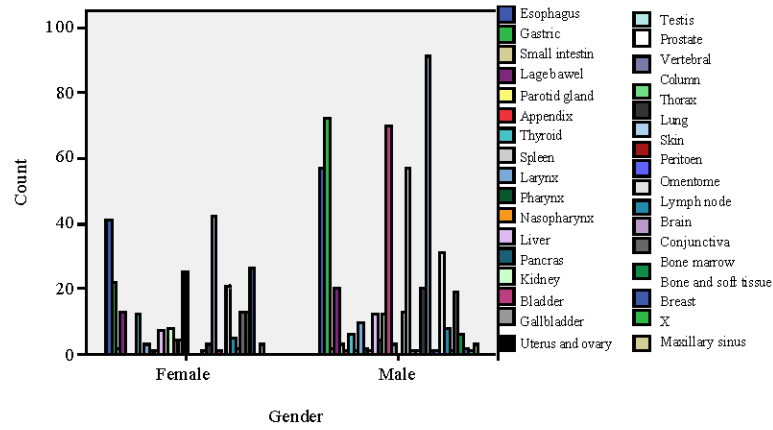
Fig. 19: Frequency diagram for relation between gender, type of cancer and rural living environment in cancerous patients in Kermanshah Province
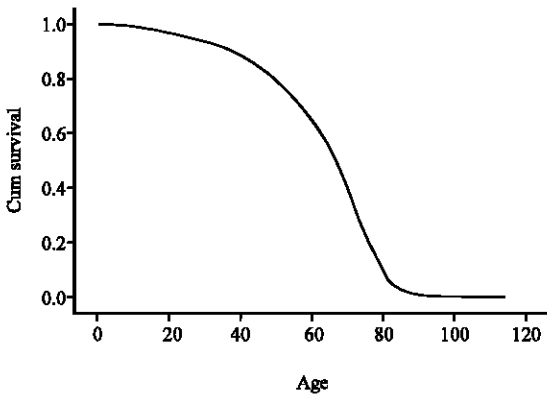

Fig. 20: Survival test diagram for cancerous men in Kermanshah Province
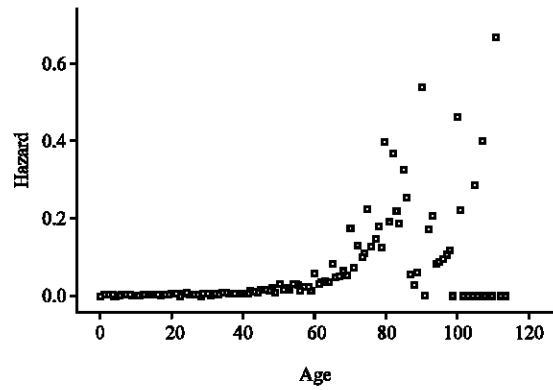

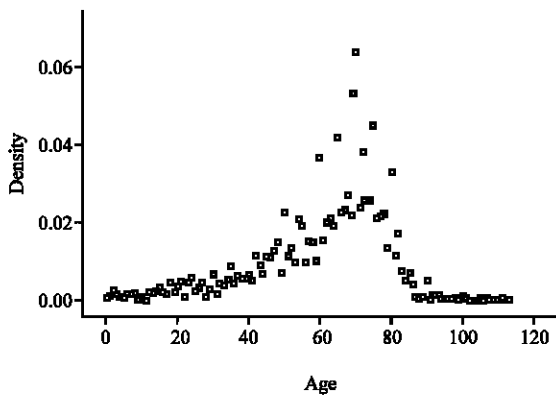Fig. 22: Hazard rate test diagram for cancerous men in Kermanshah Province

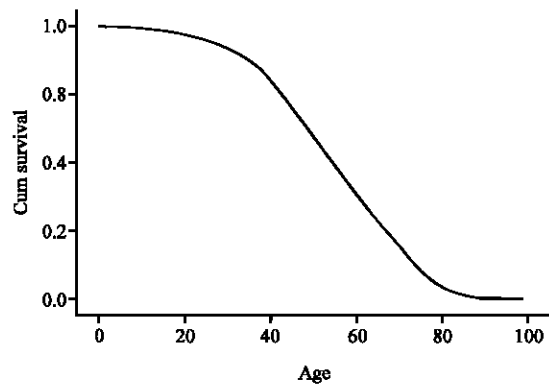Fig. 21: Density test diagram for cancerous men in Kermanshah Province

Fig. 23: Survival test diagram for cancerous women in Kermanshah Province

Table 14: Chi-square test for investigating the relation between gender, living in urban or rural environments, and type of cancer in cancerous patients in Kermanshah province

Adress		Value	df	Asymp. Sig. (2-sided)
Urbane	Pearson Chi-square continuity correction	938.017(a)	38	0.000
	Likelihood ratio	1147.912	38	0.000
	Linear-by-linear association	118.879	1	0.000
	N of valid cases	3177		
Village	Pearson Chi-square continuity correction	200.149(b)	32	0.000
	Likelihood ratio	239.450	32	0.000
	Linear-by-linear association	8.009	1	0.005
	N of valid cases	805		

a: 26 cells (33.3%) have expected count less than 5. The minimum expected count is 0.43. b: 33 cells (50.0%) have expected count less than 5. The minimum expected count is 0.34
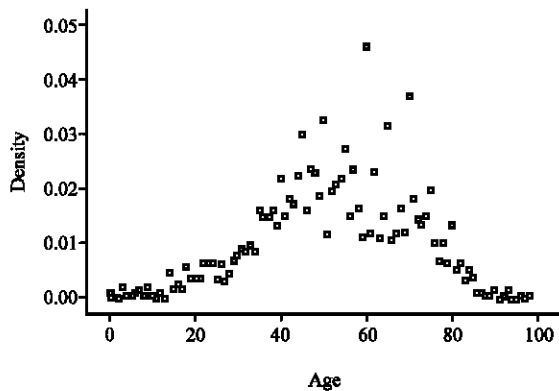

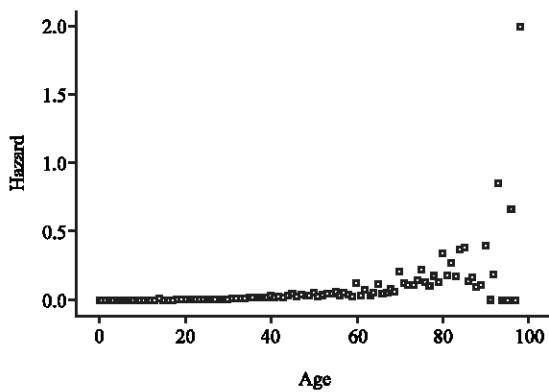Fig. 24: Density test diagram for cancerous women in Kermanshah Province

Fig. 25: Hazard rate test diagram for cancerous women in Kermanshah Province

DISCUSSION

Among the cancerous people in Kermanshah Province, skin carcinoma has the highest rate which is conventional to international references. In the study of cancer occurrence in 2004 in the United States, after skin cancer, the prostate, lung, colorectal and bladder cancers have had the maximum afflictions, respectively. Whereas in this study, it is indicated that after skin cancer the

bladder carcinoma in men has the maximum percentage of occurrence in Kermanshah Province. According to the high rate of bladder cancer in Kermanshah Province, the authors suggest a thorough investigation into the causes of bladder cancer occurrence.

The maximum cancer occurrence rate in men is in age 70 and limited to age 60-80 and in women maximum rate is in age 60 and limited to age 45-70. From the total of suffering people, approximately 60% were men and 40% were women. In men, bladder cancer, gastric and esophagus have the highest occurrence rate after skin cancer. Whereas in women, the cancers including breast, uterus and ovary and esophagus have maximum rates, respectively. Thyroid cancer in women is three times more than men. In villagers, bladder cancer is lower than people living in cities and conversely cancers including esophagus, gastric and prostate are higher than cities. The rate of breast, uterus and ovary cancer in villagers is much lower than people in cities. Also, similar to the urban environments, the maximum occurrence rate of cancers in villages is related to skin cancer, but the rate is lower than cities. In Kermanshah County bladder and breast cancers are higher than the whole province and conversely esophagus and gastric cancers are low. Generally, with regard to residence population in cities and villages of province, the rate of cancer suffering in cities is approximately two times more than villages. Among the cancer sufferers, age groups 5 (ages 68 to 84.5), 4 (ages 51 to 67.5) and 3 (ages 34 to 50.5) have the most number of patients, respectively. In group 2 (ages 17 to 33.5) and especially group 3 (ages 34 to 50.5), woman patients are more than men, whereas in other groups man patients are more than women. In age groups 1 to 7, lymph node cancer for age groups 1 and 2, breast cancer for group 3 and skin cancer for other groups have the maximum occurrence rates.

In investigating the binominal tests it is concluded that cancer occurrence rate in men and women in province is different and this rate is more in men. Also, cancer occurrence rate in cities and villages are not equal and in cities is approximately two times more than villages.

Moreover, the independent test showed that type of cancer is related to gender. The result of this test is valid for specific cancers and typical cancers for both genders. Also, independent test shows that for one specific gender, cancer tends to occur in specific age classes, which means that affliction factor to cancer and age of patient is related to each other. Furthermore, in studying the three factors including age, gender and living environment (urban or rural), it is revealed that these three factors are related to each other. In addition, relationship between age, type of cancer and living in urban or rural areas are approved. Finally, in survival test, it is determined that 90% of cancerous women have been afflicted after the age of 30 and this epoch for men is age 45 and probability of cancer affliction in men and women is decreased after the age of 60 and age 45, respectively.

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