International Journal of Medical and Health Research
ISSN: 2454-9142
Received: 22-09-2019; Accepted: 26-10-2019
www.medicalsciencejournal.com
Volume 5; Issue 11; November 2019; Page No. 152-158

Time trends of cancer in a tertiary care centre, 2013-2017

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Abstract
Background: There is limited published data on recent cancer incidence and mortality trends worldwide. Cancer is emerging as a leading cause of morbidity and mortality in India. With 8 to 9 lakh cancer cases occurring every year, it is an important public health problem. At any point of time, it is estimated that there are nearly 25 lakh prevalent cases in the country and every year about 4 lakh deaths occur due to cancer. There is no authenticated 100% cancer data on incidence/mortality of Haryana state to date as the state has recently joined the Cancer Atlas program of NCRP-ICMR.
Aim and Objectives: This study is aimed to determine the time trend line and epidemiology of cancer in a tertiary care centre from 2013 to 2017 using data extracted from Hospital Based Cancer Registry (HBCR).
Methods: All newly diagnosed cancer cases registered among cancer registry between 2013 and 2017 from various sources were analyzed.
Results: A total of 15,148 cancer cases were registered during the period 2013-2017. Of those, 8,305 (54.8%) were males and 6,843 (45.2%) were females. Based on the results of this study, a statistically significant increase in incidence was observed in both sexes for cancers of tongue, mouth, salivary gland, oropharynx, pharynx, esophagus, stomach, small intestine, colon, rectum, anal canal, liver, gallbladder, pancreas, larynx, other thoracic organ, bone, melanoma of skin, kidney, bladder, brain & nervous system, Hodgkin's disease, non-hodgkin lymphoma, multiple myeloma & lymphoid leukemia.
In females, a statistically significant increase in incidence of cancers was observed among breast and reproductive organs namely, vulva, cervix uteri, corpus uteri, uterus, ovary, other female genital organs. A statistically significant increase in incidence was seen for cancers of prostate and testis among men. There was almost threefold variation in incidence cases from January 2013 to December 2017 (1490 to 4328).
Conclusions: Over the 5-years study period; burden of cancer increased. We recommend initiating screening programs for the most common types of cancer that have valid screening tests to detect cancer during its early stages and reduce overall morbidity and mortality.

Keywords: tertiary care centre, epidemiology, incidence, trends

Introduction

Cancer is currently a global health problem and one of the leading causes of morbidity and mortality. Despite the on-going global effort to prevent cancer, a 70% rise in cancer incidence is projected in the following two decades [1]. Globally in 2013, there were 14.9 million incident cancer cases and 8.2 million cancer related deaths [2]. Prostate cancer was the most common cancer among men, whereas breast cancer was the most common cancer among women [2]. While the incidence and mortality rates for most cancers are decreasing in the United States and many other Western countries, the incidence and mortality rates are both rising in developing countries [3]. Indeed, the diagnosis of new cancer cases in less developed countries is projected to increase from 56% of the world total cases in 2008 to more than 60% in 2030. This might be partially explained by the expected increase in life expectancy, population growth [3] and access to improved diagnostic facilities. According to GLOBOCAN cancer estimation in 2012, about 57% of new cancer cases and 65% of the cancer deaths occurred in the less developed regions[4]. The overall age standardized cancer rate (ASR) in 2012 was almost 25% higher in men than in women, with rates of 205 and 165 per 100,000, respectively. There was almost fivefold variation in male incidence rates across the different regions of the world on global level [4]. The top five cancers diagnosed worldwide among men in 2012 were lung cancer (16.7%), prostate cancer (15%), colorectal cancer (10%), stomach cancer (8.5%), and liver cancer (7.5%), whereas the top five cancers diagnosed in females were breast cancer (25.2%), colorectal cancer (9.2%), lung cancer (8.7%), cervix cancer (7.9%), and stomach cancer (4.8%) [5]. Cancer is emerging as a leading cause of mortality and morbidity in India. It is an important public health problem issue with 8 to 9 lakh cases occurring every year. At any point of time, it is estimated that there are nearly 25 lakh cases in the country and every year about 4 lakh deaths occur due to cancer [6]. Keeping in view the existence of diverse pattern of cancer occurrence, present study was conducted to explore the trends of cancer among the out-patients and in-patients attended in a tertiary care centre to take treatment for the period 2013 to 2017. To our knowledge, no published data on trends on cancer incidence has so far been documented among the Gurugram population state of Haryana.

Materials and Methods

This is a retrospective study of all patients with histologically confirmed malignancies listed in the hospital cancer registry and treated amongst various departments dealing in cancer care viz- Medical Oncology and Hematology, Radiation Oncology, Surgical Oncology, Pediatrics Hematology Oncology, Obstetrics & Gynecology Oncology, Neurosurgery, Nuclear Medicine, Radio Diagnosis and Pathology as per the patient records maintained by Medical Records from January 2013 to December 2017. The analytic dataset consisted of the 15,148 incident cancers (paediatrics and adult cases) reported during the study period. Relevant variables for the purpose of the study were obtained including demographic data (gender, age) and tumor details (date of diagnosis, primary site, histology, behavior, grade, stage, and basis of diagnosis). The extracted data was coded according to the International Classification of Disease ICD-10 [7] morbidity and mortality coding system. The primary site (topography) and histology (morphology) of the malignancies are identified and coded according to the International Classification of Diseases for Oncology (3rd Edition), published by the World Health Organization (WHO) in 2000. Cases with a behavior code of 3 or 6 are included in the registry.

Statistical Methods

Trend lines are an important tool in technical analysis for both trend identification and confirmation. It is a straight line that connects two or more points and then extends into the future to act as a line of support. To study the time trends in the incidence of cancer for all sites, a linear regression method based on actual number of cancer cases by site (ICD-10) was used. A linear regression model has an equation that describes the relationship between a dependent variable y and an independent variable x. The general form of a regression line is y = a + bx, where y is the value of the dependent variable and x is the value of an independent variable, b is the slope of the line, and a is the intercept of the line. The results are presented in form of suitable tables and figures. In describing trends, a positive value of r lies in between of $0.7 < |r| \leqq 1$ indicates a strong +ve correlation the terms "significant increase" also a negative value of r lies in between of $-0.70 < |r| \leqq -0.99$ indicates a strong negative relationship the terms "significant decrease" signify that the slope of the trend was statistically significant ($p < 0.05$). The computations are performed by using of Excel sheet, SPSS version 20 and also online calculations by using the webs of: - Social Science Statistics (UNICEF) site available from: https://www.
socscistatistics.com/tests/regression/default.aspx and Graph Pad Software Quick Calcs: Available from:
https://www.graphpad.com/quickcalcs/ttest1.cfm?
Format=SD were used to analyze the data.

Results

A total of 15,148 cancer cases were registered during the period 2013-2017. Of those 8,305 (54.8%) were males and 6,843 (45.2%). were females. The sex ratio was 824 females to 1,000 males. Table 1 demonstrates the frequency distribution of these cases according to gender. The number of cancer cases has increased threefold from 2013 to 2017 (1490 to 4328) (Table 1, Fig.1).

Table 1: Number of new cancer cases registered according to gender: 2013-2016

Year	Males		Females		Total	
	#	%	#	%	#	%
2013	832	55.8	658	44.2	1,490	100.0
2014	1,191	55.2	966	44.8	2,157	100.0
2015	1,887	54.3	1,588	45.7	3,475	100.0
2016	2,013	54.4	1,685	45.6	3,698	100.0
2017	2,381	55.0	1,947	45.0	4,328	100.0
Total (2013-2017)	8,305	54.8	6,843	45.2	15,148	100.0

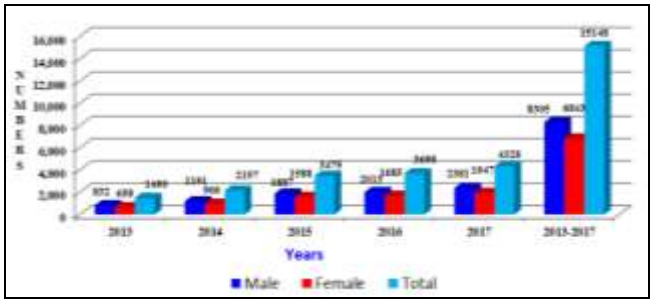

Fig 1: The trend of new cancer cases registered by gender, 2013-2017

Table 2 summarize the actual frequency of each site of five calendar years with statistical significance using slope (b)/best fit values, correlation (r)/goodness of fit with trend line and p- values based on simple linear regression. Formulating an equation for the line of best fit for two sets of variables allows us describe a relationship between the two variables through an equation of a straight line, called line of best fit, that most closely models this relationship. The line of best fit that rises quickly from left to right is called a positive correlation; if the line of best fit that falls down quickly from left to the right is called a negative correlation; strong positive and negative correlations ($0.7 < |r| \leqq 1$) have data points very close to the line of best fit; weak positive and negative correlations ($0.2 < |r| < 0.4$) have data points that are not clustered near or on the line of best fit. We examined incidence time-trends for all sites, the following results have been described as increasing or decreasing trends based on the respective positive or negative sign of the slope (b) along with the value of correlation coefficient (r) by site for both sexes
Respectively. In table 2, red colour figures denotes the trend line shows a strong +ve but not significant, blue colour figures denotes the trend line shows a strong +ve and statistically
significant, light Blue colour figures denotes the trend line shows a moderate +ve and not significant, highlighted figures in yellow colour denotes: the trend line shows a strong -ve and statistically significant and black colour figures denotes: the trend line shows a moderate –ve and not significant. The time trends for cancers of all sites for combined sexes are shown in Fig. 2 to Fig. 6 respectively.

Table 2: Number (#) of cancer cases by sites (ICD.10) and best fit values of slope (b) with Goodness of fit, is slope significantly at 95% CI among both sexes, 2013 – 2017

ICD-10	Site	Year wise number of cases					Best Fit Values	Goodness of Fit			Is slope Significantly at 95% CI	
		2013	2014	2015	2016	2017	Slope (b)	r^2	Corr. (r)	The trend line shows a	p-value	Statistically significant
C00	Lip	0	2	5	3	3	0.70 ± 0.526	0.3712	0.6093	Moderate +ve	0.2754	Not Sig.
C01-02	Tongue	39	42	65	68	90	12.80 ± 1.936	0.9358	0.9674	Strong +ve	0.0070	Significant
C03-06	Mouth	28	57	85	92	86	15.10 ± 4.535	0.7870	0.8871	Strong +ve	0.0447	Significant
C07-08	Salivary Gland	4	3	8	13	27	5.60 ± 1.510	0.8209	0.9061	Strong +ve	0.0341	Significant
C09	Tonsil	4	3	11	3	18	2.80 ± 1.793	0.4485	0.6697	Moderate +ve	0.2162	Not Sig.
C10	Oropharynx	2	2	4	12	13	3.20 ± 0.748	0.8591	0.9269	Strong +ve	0.0235	Significant
C11	Nasopharynx	16	8	14	30	29	4.80 ± 2.197	0.6141	0.7836	Strong +ve	0.1168	Not Sig.
C12-13	Hypopharynx	7	10	22	14	23	3.60 ± 1.562	0.6391	0.7994	Strong +ve	0.1045	Not Sig.
C14	Pharynx Uns	1	2	2	2	3	0.40 ± 0.116	0.8000	0.8944	Strong +ve	0.0405	Significant
C15	Esophagus	34	41	62	79	73	11.60 ± 2.590	0.8699	0.9327	Strong +ve	0.0207	Significant
C16	Stomach	37	54	96	101	94	16.10 ± 5.037	0.7730	0.8792	Strong +ve	0.0495	Significant
C17	Small Intestine	2	6	8	19	23	5.50 ± 0.789	0.9419	0.9705	Strong +ve	0.0061	Significant
C18	Colon	37	53	94	92	104	17.30 ± 3.747	0.8767	0.9363	Strong +ve	0.0191	Significant
C19-20	Rectum	27	55	71	69	97	15.40 ± 2.835	0.9076	0.9527	Strong +ve	0.0123	Significant
C21	Anus & Anal Canal	2	6	10	15	12	2.90 ± 0.814	0.8087	0.8993	Strong +ve	0.0378	Significant
C22	Liver	39	39	75	72	104	16.30 ± 3.473	0.8801	0.9380	Strong +ve	0.0183	Significant
C23-24	Gall Bladder	28	34	60	54	80	12.40 ± 2.653	0.8792	0.9370	Strong +ve	0.0185	Significant
C25	Pancreas	22	25	57	46	66	10.90 ± 3.218	0.7927	0.8900	Strong +ve	0.0429	Significant
C30-31	Nose, Sinus etc.	4	4	4	3	8	0.70 ± 0.586	0.3224	0.5678	Moderate +ve	0.3181	Not Sig.
C32	Larynx	24	31	48	46	70	10.70 ± 1.999	0.9050	0.9510	Strong +ve	0.0128	Significant
C33-34	Lung etc.	101	118	185	161	178	19.70 ± 7.448	0.6999	0.8370	Strong +ve	0.0773	Not Sig.
C37-38	Other Thoracic Org	4	4	7	9	13	2.30 ± 0.379	0.9250	0.9620	Strong +ve	0.0090	Significant
C40-41	Bone	29	41	62	72	86	14.50 ± 0.885	0.9889	0.9950	Strong +ve	0.0005	Significant
C43	Melanoma of skin	5	5	26	24	39	8.70 ± 1.879	0.8770	0.9360	Strong +ve	0.0190	Significant
C44	Skin	7	18	8	0	0	-3.20 ± 1.973	0.4672	-0.6835	Moderate -ve	0.2033	Not Sig.
C45	Mesothelioma	4	3	1	2	0	-0.90 ± 0.252	0.8100	-0.9000	Strong -ve	0.0374	Significant
C47+ 49	Conn.& Soft Tissue	38	27	75	67	83	13.00 ± 4.712	0.7172	0.8469	Strong +ve	0.0702	Not Sig.
C50	Breast	209	307	452	464	535	80.90 ± 12.23	0.9359	0.9674	Strong +ve	0.0070	Significant
C51	Vulva	2	2	3	9	10	2.30± 0.574	0.8424	0.9180	Strong +ve	0.0279	Significant
C52	Vagina	0	1	2	1	2	0.40 ± 0.20	0.5714	0.7559	Strong +ve	0.1393	Not Sig.
C53	Cervix Uteri	39	47	84	93	91	15.00 ± 3.664	0.8482	0.9210	Strong +ve	0.0264	Significant
C54	Corpus Uteri	29	35	130	112	148	31.50 ± 8.695	0.8139	0.9020	Strong +ve	0.0362	Significant
C55	Uterus Unspecified	1	6	8	11	13	2.90 ± 0.30	0.9689	0.9840	Strong +ve	0.0024	Significant
C56	Ovary etc.	42	57	143	147	158	32.20 ± 7.799	0.8503	0.9220	Strong +ve	0.0258	Significant
C57	Ot. Fem Genital Organ	0	1	2	3	6	1.40 ± 0.231	0.9245	0.9610	Strong +ve	0.0090	Significant
C58	Placenta	1	0	0	0	0	-0.20 ± 0.116	0.5000	-0.7071	Strong -ve	0.1817	Not Sig.
C60	Penis	0	3	3	6	4	1.10 ± 0.473	0.6437	0.8023	Strong +ve	0.1024	Not Sig.
C61	Prostate	53	123	275	364	390	91.50 ± 11.59	0.9541	0.9768	Strong +ve	0.0042	Significant
C62	Testis	10	12	15	14	20	2.20 ± 0.529	0.8520	0.9230	Strong +ve	0.0253	Significant
C64	Kidney	31	44	72	85	95	16.90 ± 1.723	0.9697	0.9850	Strong +ve	0.0023	Significant
C65	Renal Pelvis	1	1	0	0	3	0.3 ±	0.15	0.3873.	+ve weak	0.5195	Not Sig.
C66	Ureter	0	0	1	0	1	0.20 ± 0.163	0.3334	0.5774	Moderate +ve	0.3081	Not Sig.
C67	Bladder	27	59	90	92	108	19.50 ± 3.466	0.9134	0.9560	Strong +ve	0.0111	Significant
C68	Uns. Urinary Org.	0	1	0	1	1	0.20 ± 0.163	0.3333	0.5774	Moderate +ve	0.3081	Not Sig.
C69	Eye	2	6	7	10	5	1.00 ± 0.894	0.2941	0.5423	Moderate +ve	0.345	Not Sig.
C70-72	Brain, nervous Sys	152	217	273	310	327	44.30 ± 5.651	0.9535	0.9760	Strong +ve	0.0043	Significant
C73	Thyroid	12	64	114	95	104	21.50 ± 8.545	0.6785	0.8240	Strong +ve	0.0865	Not Sig.
C74	Adrenal Gland	2	0	5	5	9	1.90 ± 0.597	0.7714	0.8780	Strong +ve	0.0500	Not Sig.
C81	Hodgkin's D	30	38	75	77	93	16.50 ± 2.773	0.9219	0.9600	Strong +ve	0.0095	Significant
C82-85	NHL	91	116	174	170	196	26.40 ± 5.025	0.9020	0.9497	Strong +ve	0.0134	Significant
C86	Other spec lymph	0	1	0	0	0	-0.10 ± 0.153	0.1250	-0.3536	-ve corr.	0.5594	Not Sig.
C88	Immuno. Proli. disease	1	3	1	3	3	0.40 ± 0.327	0.3334	0.5774	moderate +ve	0.3081	Not Sig.
C90	Multiple Myeloma	23	48	72	75	105	19.10 ± 2.259	0.9597	0.9796	Strong +ve	0.0035	Significant
C91	Lymphoid Leuk	26	51	75	70	131	22.90 ± 5.155	0.8681	0.9320	Strong +ve	0.0212	Significant
C92-94	Myeloid Leuk	23	23	46	35	91	14.80 ± 5.729	0.6898	0.8310	Strong +ve	0.0816	Not Sig.
C95	Leukemia Uns	7	6	0	1	10	0.10 ± 1.535	0.0014	0.0376	No corr.	0.9522	Not Sig.
C96	CMD, O & U LHM	0	0	10	11	5	2.100 ± 1.491	0.3980	0.6309	Moderate +ve	0.2538	Not Sig.
O &U*	Other and Uns	131	192	178	266	242	29.60 ± 9.401	0.7677	0.8760	Strong +ve	0.0513	Not Sig.
Total		1490	2157	3475	3698	4328	721.7 ± 92.06	0.9535	0.9765	Strong +ve	0.0043	Significant

*Other and unspecified incudes the site: C26, C39, C49, C75, C76, C78, C79, C80 & C97

The following results have been described as increasing or decreasing trends based on the respective positive or negative sign of the correlation coefficient (r) goodness of fit of trend line. Results with no significant value were considered as stable. Among both sexes, a statistically significant upward trend was observed with a strong positive correlation (r) lies in between ($0.7 < |r| \leqq 1$) for cancers of tongue (0.0070, $p<0.05$) mouth (0.0447, $p<0.05$), salivary gland (0.0341, $p<0.05$), oropharynx (0.0235, $p<0.05$), pharynx (0.0405, $p<0.05$), esophagus (0.0207, $p<0.05$), stomach (0.0495, $p<0.05$), small intestine (0.0061,<0.05), colon (0.0191, $p<0.05$), rectum (0.0123, $p<0.05$) anus and anal canal (0.0378, $p <0.05$), liver (0.0183, $p<0.05$), gallbladder (0.0185, $p<0.05$), pancreas (0.0429, $p<0.05$), larynx (0.0128, $p<0.05$), thoracic organ (0.0090, $p<0.05$) bone (0.0005, $p<0.05$), melanoma of skin (0.0190, $p<0.05$), kidney (0.0023, $p<0.05$), bladder (0.0111, $p<0.05$), brain & nervous system (0.0043, $p<0.05$), hodgkin's disease (0.0095, $p<0.05$), NHL (0.0134, $p<0.05$), multiple myeloma (0.0035, $p<0.05$), lymphoid leukemia (0.0212, $p<0.05$) also in all sites (0.0043, $p<0.05$).

In females, a statistically significant upward trend was observed with a strong positive correlation (r) lies in between ($0.7 < |r| \leqq 1$) for cancers of breast (0.0070, $p<0.05$), vulva (0.0279, $p<0.05$), cervix uteri (0.0264, $p<0.05$), corpus uteri (0.0362, $p<0.05$), uterus (0.0024, $p<0.05$), ovary (0.0258, $p<0.05$) other female genital organs (0.0090, $p<0.05$). A strong positive correlation was observed among females for cancers of vagina also a strong negative correlation was observed for cancers of placenta. In males, a statistically significant increase in incidence was seen for cancers of prostate (0.0042, $p<0.05$) (Fig.2)

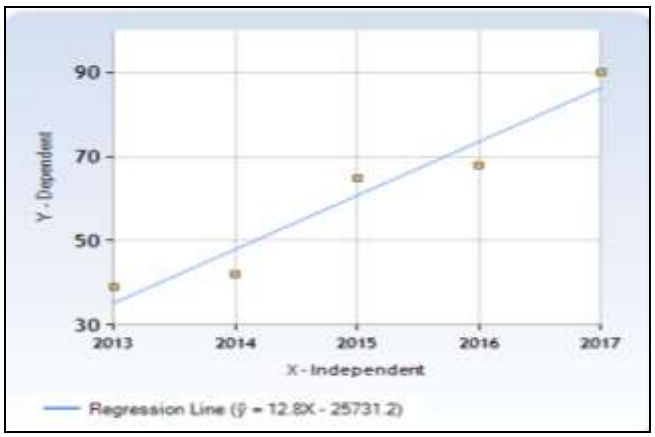

Fig 2: The trend line shows a strong +ve correlation and statistically significantly ($p<.05$)

A strong positive trend was observed among both sexes for cancers of nasopharynx, hypopharynx, lung, connective & soft tissue, thyroid, adrenal gland, myeloid leukemia and other & unspecified sites. Among females, a strong positive trend was observed for cancer of vagina (Fig.3).

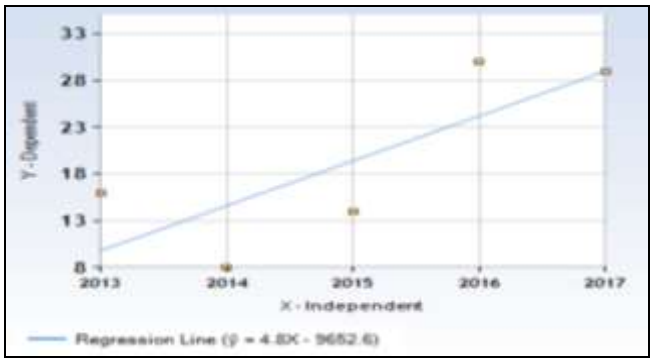

Fig 3: The trend line shows a strong +ve correlation ($0.7 < |r| \leqq 1$)

A moderate positive trend was observed in both sexes for cancers of lip, tonsil, nose & sinus, ureter, unspecified site of urinary organ, eye, immunoproliferative diseases, other & unspecified sites of malignant neoplasms of lymphoid, haematopoietic and related tissue (Fig.4).

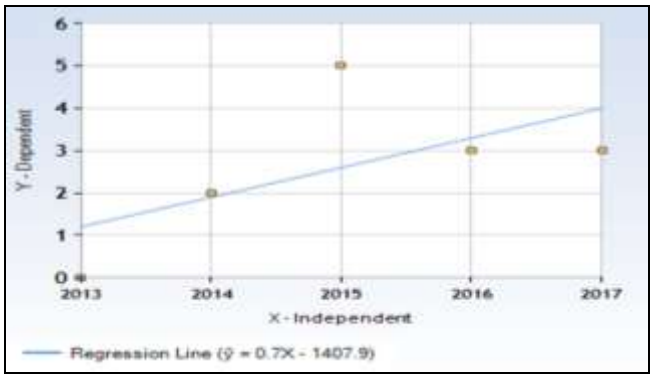

Fig 4: The trend line shows a moderate +ve correlation ($0.4 < |r| \leqq 0.7$)

Among both sexes, a statistically significant downward incidence trend was seen for cancer of mesothelioma. In females, the decline in incidence was seen for cancers of skin and placenta (Fig.5 & Fig.6).

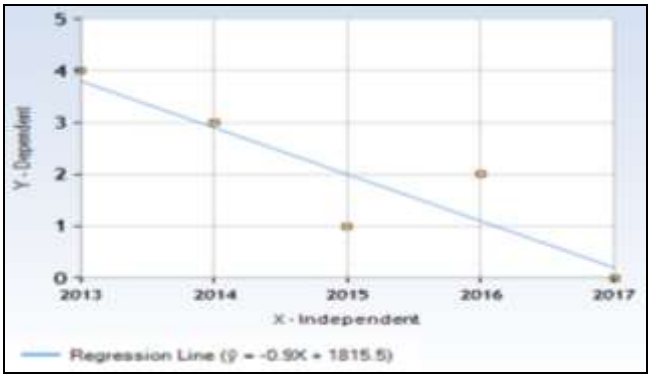

Fig 5: The line shows a strong negative ($-0.7 < |r| \leqq -1$) and statistically significantly ($p<.05$)

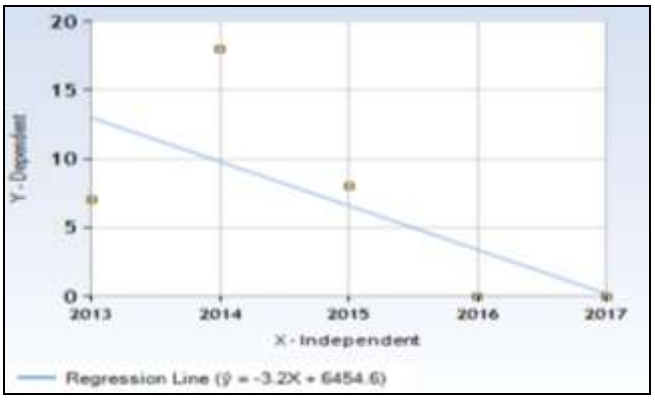

Fig 6: The line shows a moderate correlation (-0.4＜|r|≦＜-0.7)

Discussion

The total world incidence shows the enormous health problem caused by cancer, which is recognized as the second killer disease in humans. Cancer is a global health issue and it is the most common non-communicable disease. Approximately, one-third of it is preventable, another third are potentially curable if detected early and the remaining third incurable but managed with palliative care to improve the quality of life [1]. The overall incidence of cancer is known to rise with increasing age. Control of communicable disease, has increased life expectancy and therefore more of the population live longer resulting in an increase in the older age groups population. The increase in population due to growth and increased life expectancy also contributes to the increase in the number of cancer cases. Improved literacy, greater consciousness about health in general and awareness about cancer in particular makes more people seek medical advice at an earlier stage. Availability and access to sophisticated and improved diagnostic techniques, aid in detection of tumors that would have been missed in earlier times [6]. Epidemiology is an important tool which can be employed to determine a disease load, time trends and possible aetiological factors. With respect to cancer, such a study can help in planning of treatment facilities in the country and also preventive strategies. It can also provide the necessary guidelines for determining the degree of risk for various groups of people and identifying high risk groups [8]. Time trends in the incidence of cancer in defined populations are of particulars interest since they imply changes in exposure to carcinogens. Changes due to variation in genetic susceptibility in a population would be seen only if there were widespread migrations of individuals out of region; changes that are the result of genetic variation between generations within a stable population would be relatively small and very slow in occurrence [9]. The common sites for cancer in India are oral cavity, lungs, esophagus and stomach in males and cervix, breast and oral cavity among females [10]. Within India there exist variations in the prevalence and pattern of different cancers. In southern India the common cancers among male were found to be stomach, oral, esophagus and leukemia whereas females were mainly affected by cervix, breast, oral and oesophageal cancers [11, 12]. Similarly, Maiti P, Jana U, *et al* published a study [13] from West Bengal, an eastern state of India reporting head and neck, lungs and oral cancers as major cancers in males, whereas among female, breast cancer was leading followed by cervical and stomach cancers. In contrast, among north Indian males, gastro intestinal tract, larynx and lung are major cancers and among females breast, cervix and lung were leading malignancies [14]. The geographical differences in total number and site incidences have provided clues of causative factors; especially, in separating environmental and ethnic factors from intrinsic factors. In Japan cancer of the stomach is the most common malignant tumor in both men and women in marked contrast to other countries[15]. The high incidence of cancer of the mouth in India is well-known and has led to the identification of habit of chewing tobacco with betel nut as a risk factor [16]. There is need of obtaining more clear information on cancer epidemiology such as prevalence, incidence and risk factors in order to generate evidences for effective decision making to prevent and control the cancer epidemic in the country.

Our present study is the first study in the region to find out the time trends of cancer burden among males and females in all sites. Analysing the overall time trends (2013-2017) in both sexes, most patients were males (54.8%) and sex ratio was 1.21:1 (male to female). The sex ratios of cancer incidence in other studies were high in male patients. Maisinneuve and Lowenfels [17] reported that the prevalence of cancer was twice in men than it was in women. Studies performed in Belgium in 2003 [18], Canada, the United States, and Western Europe indicted consistent findings, but the opposite occurred in Western Europe, except France. Based on the results of our study, a statistically significant variation observed among both sexes as per anatomical sites of cancer are: tongue, mouth, salivary gland, oropharynx, pharynx, esophagus, stomach, small intestine, colon, rectum, anal canal, liver, gallbladder, pancreas, larynx, other thoracic organ, bone, melanoma of skin, kidney, bladder, brain & nervous system, Hodgkin's disease, non-hodgkin lymphoma, multiple myeloma & lymphoid leukemia. In females, a statistically significant increase in incidence of cancers was observed among breast and reproductive organs namely, vulva, cervix uteri, corpus uteri, uterus, ovary, other female genital organs. A statistically significant increase in incidence was seen for cancers of prostate and testis among men. There was almost threefold variation in incidence cases from January 2013 to December 2017 (1490 to 4328). A statistically significant strong negative relation seen in a caner observed amongst both sexes as per anatomical site of disease is mesothelioma.

A strong negative relationship was observed among cancer of females anatomical site is placenta. A moderate negative relationship was observed among both sexes as per anatomical site of cancers is skin. Similar to our study, NCRP (ICMR) [6, 11, 19, 26] have reported, among males, a statistically significant increase in time trends in cancers incidence rates of the tongue, mouth, colon, rectum, liver, lung, prostate, brain, non-hodgkin's lymphoma and lymphoid leukemia. Some additional sites of cancer for males that have shown a rising trend are gall bladder, pancreas, kidney and urinary bladder. In females, cancer of the gall bladder, lung, breast, corpus uteri, ovary, thyroid, brain, non-hodgkin's lymphoma and myeloid leukemia have shown a statistically significant increase. Also a decline trend was also observed in cancer of cervix. Tyagi and Verma [20] have studied the time trend for all sites by sex in Delhi and found increasing trend among males for cancer involving the gallbladder, prostate, urinary bladder, kidney, brain, lymphomas and leukemia and in females for cancer involving colon, gallbladder, breast, endometrium, ovary urinary bladder and lymphomas.

A significant variation of cancer sites has been reported due to life style, personal dietary habits, past history of illness and consumption of tobacco as the leading cause of cancers in India. The current analysis of time trend suggests that tobacco consumption control remains priority for cancer control in India. The increase in incidence of breast cancer is likely to be the result of changing prevalence and distribution of risk factors that are allied to reproductive, dietary and other lifestyle choices that are correlated with economic growth. The observations of current study are similar to those observed by previous studies [21- 25]. The current analysis of time trend clearly identifies needs for the control of female breast cancer at the primary, secondary and tertiary level within India. While modification in lifestyle is difficult, prospects for a reduction in disease include the control of obesity and detecting cases at early stages via the promotion of self-breast examination or clinical breast examination after the age of 50.

In males, present study shows, a statistically significant increase in incidence was seen for cancers of prostate. Prostate cancer is the second most frequently diagnosed cancer and the sixth leading cause of cancer death among men worldwide, with 0.9 million new cases and 0.3 million deaths projected to occur in 2008[1]. More than half of these cases and deaths are expected to occur in more developed countries [1]. Present study explored, a negative and strong correlation was observed in both sexes for cancer of skin, mesothelioma and in females, cancer of placenta. Similar to our study, a decreasing trend was found for cancer of tongue, hypopharynx, esophagus and penis in males and stomach in females. Luthra and Jain [26] have studied the time trend in age-adjusted cancer incidence rates in Bangalore, Bombay and Madras cancer registries during 1982-1989 and found that time trend analysis did not reveal any significant increase or decrease in age-adjusted cancer incidence. Jussawala, Yeole and Sunny [27] have studied the time trend analysis in age-adjusted incidence rates at various sites in Greater Bombay patients during 1982 to 1996 and found that overall age-adjusted rates are seen to increase 0.32 percent per year in males and 1.04 percent per year in females.

This study explored the aforementioned discussion stresses the burden of certain cancers particularly breast, cervix uteri, prostate, lung, mouth, esophagus, stomach, anus and anal canal, bone, and kidney on the global level and the regional level and in India as well. The present study is probably the first study of its kind which has depicted the true caseload of cancer being handled in a hospital of NCR region. Cancer rate are static, but number of cases rising in India. Many factors were responsible, such as changing life styles, smoking, chewing and sniffing of tobacco, increased consumption of alcohol, changes in dietary habits, obesity, late age of pregnancy and fewer births, environment pollution, urbanization and higher life expectancy, improvements in cancer registration systems, declining mortality due to early detection and treatment are all related to a significant increase in incidence of cancer in India. The results of this study provided useful information for the prediction of changes in the incidence of cancer and subsequent design of cancer control programs in India.

Limitations

This study has certain limitations, perhaps the greatest of which was the limited quality of cancer surveillance data currently available on the NCR population. For example, large proportions of data on cancer stage were missing. Even though the present study is giving us an idea about the pattern of cancers treated at a NCR hospital; it is far from the true picture prevalent in the community at large. The overall incidence of cancer shows an increasing trend in several tumors among both sexes and the number of cancers diagnosed/treated increased by threefold.

Conclusions

Cancer incidence is increasing gradually among the population. There is need for strengthening and augmenting the existing diagnostic and treatment facilities, complete follow-up, strengthen the referral channels and conducting campaigns under National Programs to increase awareness among the population

Acknowledgments

The authors would like to acknowledge to Mr Sujeet Singh (Social worker) and Ms Manisha (DEO) Cancer Registry for their efforts in gathering data; Ms Shikha Goyal (DEO) from the Medical Records for providing the data, Fortis Memorial Research Institute Gurgaon.

Funding

This study had no funding source.

Competing Interests

The authors declare that they have no competing interests.

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