"Incidence of Cancer in Tirunelveli Medical College and Hospital-A Five Years Cancer Surveillance Project"

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Abstract: *Worldwide, cancer is the second leading cause of death next to cardiovascular disease. It was estimated that in the year of 2008, over 12.7 million new cancer cases have occurred worldwide and 7.6 million people died due to cancer. It accounted for around 20% of all deaths in the year of 2008. Environmental factors are responsible for most of the cancers, in which, modifiable risk factors play a major causative role and these are avoidable. The main risk factors associated with cancers are tobacco use, alcohol consumption, infections, dietary habits and physical inactivity. Tobacco use accounts for 50% of all cancers in males.*

Keywords: *Malignancy, Squamous cell carcinoma, histopathological study, incidence.*

I. Introduction

Cancer is a group of diseases which is characterized by an abnormal proliferation of cells, which invade adjacent tissues and spread to distant organs. If the tumour has progressed beyond the curable stage it causes even death (Vinay Kumar et al 2010)[1]. Cancer can be broadly divided into three categories on the basis of cell genesis: (a) Carcinomas, that arise from epithelial cells (e.g. lining of mouth, esophagus, intestines, skin and uterus); (b) Sarcomas, which arise from mesodermal cells (e.g. fibrous tissue, fat and bone); and (c) Lymphomas, myeloma and leukemias arising from the hematopoietic cells and immune system (Vinay Kumar et al 2010)[1].

In India, the International Agency for Research on Cancer (IARC) estimated around 635000 people died due to cancer in 2008, representing around 8% of all estimated global cancer deaths and around 6% of all deaths in India. Absolute number of new cancer cases is increasing rapidly due to urbanization, industrialization, lifestyle changes, population growth and ageing (Rajesh Dikshit et al 2012)[2]. The Indian council of medical research (ICMR) initiated the cancer registration network through the national cancer registry programme (NCRP) and commenced a network of cancer registries in various regions of the country.

The stated objectives of NCRP is,

➢ Provide an idea of the pattern of cancer in the area
➢ To undertake epidemiological research through cohort and case control studies based on registry data
➢ Helps to formulate strategies for national cancer control programme
➢ Cancer registration and epidemiology needs human resource development (Usha K. Luthra et al 1993)[3].

The cancer registry has been collecting all necessary data pertaining to cancer patients in a prescribed format and with specified guidelines. The collected data is stored in a computer. All malignant neoplasms are registered and classified according to the International Classification of Disease for Oncology (ICDO) (Usha K. Luthra et al loc .cit 1993)[3]. The methods of diagnosing cancer patients differ between pathological laboratory and private and government hospitals. The core proforma consists of name of the patient, age, sex, date of birth, address, name of their parents and marital status(if married) –mainly for cross checking the duplicate registration. In addition to this, the topography, morphology of tumor and the date of diagnosis should also be included. The coding has to be done as per the ICD-O (N.K. Ganguly et al 2006)[4].

The diagnostic information and coding should be checked by a principal investigator (pathologist or radiotherapist) of the centre. If the primary site of tumor is not known, the treating clinician should be contacted for details (N.K. Ganguly et al 2006 loc. cit)[4]. In our institution, the Department of Pathology -Tirunelveli Medical College, co- ordinated with National Cancer Registration Programme and correlated hospital based cancer surveillance project for a period of three years from 2001-2003.The present study is a continuation of the hospital based cancer registry programme and focuses on analysis of cancer trends and patterns in Tirunelveli Medical College.

Aim of the Study
1) To know the pattern of cancer for a period of 5 years by hospital based cancer surveillance as per International Classification of Disease-for Oncology (ICD-O)
2) Observation done at Tirunelveli Medical College and hospital for a period of five years from 2007 to 2011.
3) To find out the incidence of cancer among males and females.
4) To assess the age and sex distribution of cancers.
5) To analyse the pattern of emerging new cancer types.

II. Materials And Methods

1.Study area and Period:
Tirunelveli Medical College and Hospital, from January 2007 to December 2011.
2.Study Population:
General population who attended in outpatient department, admitted as inpatient and diagnosed as having malignancy.
3.Methods of Study:
Information regarding the incidence of cancer was obtained from the biopsy, cytology and hematology report register in the Department of Pathology at Tirunelveli Medical College and Hospital.
A prediagnosed questionnaire was prepared for data collection.
4.Duration of Study:
This study was observed over a period of 5 years from 2007 to 2011.
5.Inclusion Criteria:
Out of fine needle aspiration cytology study, haematological study and histopathological study, histopathological data was taken an inclusive criteria. Between incisional and excisional biopsy of histopathological study, excisional biopsy was considered as an inclusive criteria.
6.Exclusion Criteria:
Compared to histopathological study, fine needle aspiration cytology is less significant. In such cases FNAC was considered as exclusion criteria to avoid duplication. In peripheral smear study versus bone marrow aspiration study, peripheral smear study is less significant. Hence it was excluded to avoid duplication.

III. Observation And Results

During the year of 2007 to 2011, there were totally 36558 biopsies received in the Department of Pathology in Tirunelveli Medical College and Hospital from both outpatient and inpatients. Out of which, 4162 (11.38%) cases were diagnosed microscopically as cancer, and the remaining cases (88.62%) were diagnosed as non tumoral lesions and Benign tumors. The following chart depicts the total incidence of cancer (fig: 1)
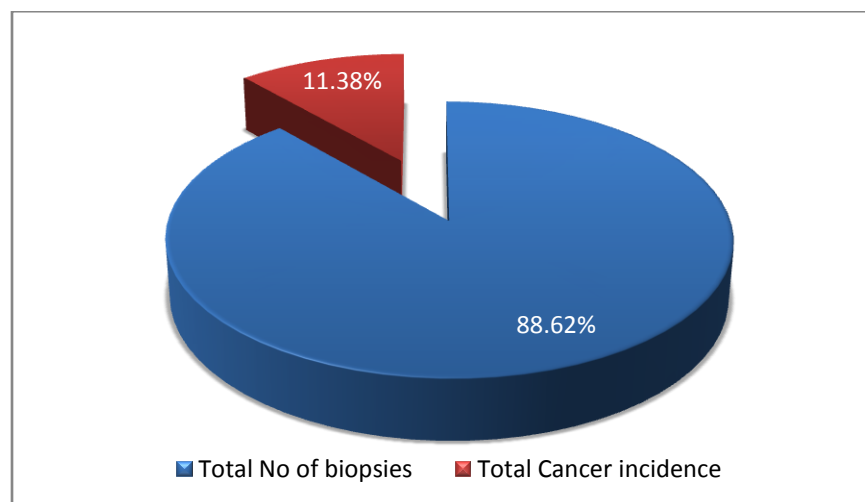

Figure: 1. Total incidence of cancer from 2007 to 2011.

The data was analyzed by the standard statistical software namely PASW (Predictive and Analysis Soft Ware) Statistics-18, the so called SPSS. The trends of increase from base year (2007) through end year (2011) were analyzed in terms of percentages and interpreted by χ^2 (Chi-square) Test. The gender and child wise trends of age incidence were analyzed and interpreted by general linear model (Two ways ANOVA). The age of incidence between the gender was analyzed by Students unpaired 't' test. The trends of sites of occurrence and diagnosis were analyzed in terms of percentages. The P-Value < 0.05 was considered as statistically significant under two-tailed situation. The total cancer incidence from 2007 to 2011 were 4162 cases (11.38%).The following table and figure depicts the cancer incidence from 2007 to 2011.

Table-1.Total no of cancer incidence from 2007 to 2011

YEAR	NO OF BIOPSIES	NO OF CANCERS	%
2007	5941	661	11.1
2008	6431	675	10.5
2009	7746	837	10.8
2010	8091	929	11.5
2011	8349	1060	12.7
Total	36558	4162	11.38

The above table (1) depicts the yearly cancer incidence. During the year 2007, there were totally 661 cases (11.1%) diagnosed microscopically as cancer, followed by 675 cases (10.5%) in 2008, 837 cases (10.8%) in 2009, 929 cases (11.5%) in 2010 and 1060 cases (12.7%) in 2011. This reveals that the percentages of distribution of cancer cases were gradually increasing from base year to end year.

Trends of cancer incidence:
The trends of cancer incidence from base year to end year (2007-2011).

Table-2. Gender wise incidence of cancer (2007 to 2011)

Gender	2007		2008		2009		2010		2011		Total
	No	%	No	%	No	%	No	%	No	%	
Males	234	35.4	237	35.1	394	47.1	427	46.0	498	47.0	1790
Females	413	62.5	426	63.1	424	50.6	484	52.1	545	51.4	2292
Children	14	2.1	12	1.8	19	2.3	18	1.9	17	1.6	80
Total	661	15.9	675	16.2	837	20.1	929	22.3	1060	25.5	4162
χ^2	50.504										
d.f	8										
Significance	P<0.001										

The gender wise incidence of cancer from base to end year is shown in the above table(2). The table (2) showed that the incidence of cancer among the males were increasing steadily from 35.4% to 47% and the increase was statistically highly significant (P<0.001). Among the females, the cancer incidence is fluctuating from 2007(62.5%) to 2011 (51.4%) and the same was also statistically significant (P<0.001). But, among children the incidence was fluctuating in between 2.1% to 1.6%. The total incidence of cancer cases from base to end was 15.9% to 25.5%.The increase was steady and statistically very highly significant (P<0.001). During the year 2007, totally 647 adult cases were diagnosed as cancer, Out of which, 65.69% were females, the remaining 34.31% were males. In the year of 2008 totally 663 adult cases (males-40.87%, females -59.13%) were diagnosed with cancer. In the year of 2009 totally 818 adult cases (males-48.18%, females-51.82%) were diagnosed as cancer, similarly in the year of 2010 and 2011totally 911(males-46.76%, females-53.24%) 1043(males-47.75%females-52.25%) adult cases were diagnosed as cancer in respectively.Table2 showed that in the gender wise incidence of cancer in adults and children, 55.08% (2292 cases) were females, 43% (1790cases) were males and the remaining 1.92% (80cases) were children.

Trends of cancer incidence based on age:
The incidence of cancer cases were analyzed according to their age. The mean age of males increased from 2007 (mean age-54.9, +/_14.1) to 2010 (mean age-58.5+/-12.4) and decreased in 2011(mean age-56.9+/-12.1). The mean age of females was fluctuating from 2007 (mean age-51.4, SD-12.4) through 2011(mean age-52.3+/-13.4).The mean age of males between the years was not statistically significant except for the year 2010 (P>0.05). The mean age of women and children was also not statistically significant between the years (P>0.05).

Incidence of cancer based on Gender:
The incidence of cancer among the male and female age groups (in years) was compared.

Table -3. Comparison of cancer incidence between male and female for five years period (2007-2011).

Gender	N	Age (years)		Difference between means	't'	d.f	Significance
		Mean	SD				
Males	1790	56.9	12.9	4.7	9.182	4080	P<0.001
Females	2292	52.2	18.3				

The mean age of cancer incidence among the males and females were 56.9± 12.9 and 52.2 ± 18.3.The difference of age between male and female was statistically significant (P<0.001).

Trends of cancer Incidence based on site:
The following table (4) shows the incidence of cancer categorized according to the topographic sites from 2007 to 2011.

Table- 4.Topographic Site of cancer incidence, 2007-2011

SITES	2007	2008	2009	2010	2011
Head & Neck (C00-12,C30-32)	107	124	188	279	347
1)Oral cavity (C06.9)	46	64	80	100	137
2)Oropharynx (C10)	30	22	41	62	68
3)Nasopharynx (C11)	4	8	7	15	12
4)Hypopharynx (C13)	8	13	25	48	57
5)Larynx (C32)	5	5	22	31	47
6)Salivary gland (C08)	12	12	11	22	21
7)Ear & Eye (C44.2&C69)	2	0	2	1	5
Breast (C50)	106	111	101	125	116
Thyroid (C73)	42	38	46	45	62
GIT (C15-26)	84	90	124	77	118
1)Esophagus (C15)	4	15	17	5	14
2)OGJ (C16.0)	0	6	5	1	0
3)Stomach (C16)	34	35	43	22	32
4)Small intestine (C17)	2	1	1	3	4
5)Colorectum(C18&C20)	26	13	29	21	39
6)Anus (C21)	4	3	7	5	9
7))GIT NOS(C26.9)	14	17	22	20	20
FGT(C51-58)	157	177	150	149	170
1)Endometrium (C54.1)	7	4	7	4	6
2)Cervix (C53)	134	144	122	112	141
3)Fallopian tube (C57.0)	0	0	0	1	1
4)Ovary (C56)	11	16	14	23	17
5)Vagina (C52)	3	11	4	7	4
6)Vulva (C51)	2	2	3	2	1
MGT (C60-63)	18	22	27	33	37
1)Penis (C60)	13	14	18	17	25
2)Prostate (C61)	5	5	6	13	9
3)Testis (C62)	0	3	3	3	3
Urinary Tract (C64-68)	22	26	14	18	26
1)Kidney (C64)	4	10	1	6	4
2)Ureter (C66)	0	0	0	0	1
3)Bladder (C67)	18	16	13	12	20
Bone&SoftTissue (C40-41,49)	4	6	14	4	2
Skin (C44)	22	6	28	25	16
Lymph Nodes (C77)	56	36	48	67	58
Hematopoietic System (C42)	-	14	20	12	26
Other Sites	43	25	77	95	82
Total	661	675	837	929	1060

The above table (4) depicts the trends of cancer incidence in respect to sites. Cancer patterns vary not only throughout the world but also in different population groups within the same country. The above table (4) shows year wise categorization of cancer sites which includes Head neck (oral cavity, lip, cheek, tongue, tonsil, mouth, oropharynx, nasopharynx, hypopharynx, larynx, salivary glands, eye and ear), gastrointestinal tract (esophagus,

stomach, small intestine, colon and anal canal), female genital tract (uterus, cervix, ovary, fallopian tube, vagina and vulva), male genital tract (testis, penis and prostate), urinary tract (kidney, ureter and urinary bladder), lymph node and other sites including lung, brain, adrenal bone & soft tissue, skin and hematopoietic system. In which the most commonly observed cancer types were squamous cell carcinoma, Adenocarcinoma and invasive ductal carcinomas.

Table. 5. The top ten leading cancer sites in 2007, both Male & Female.

RANK	SITE	NO OF CANCERS	%
1	Cervix (C53)	134	20.27
2	Head & Neck(C00-14&C30-32)	107	16.19
3	Breast (C50)	106	16.04
4	GIT (C15-C26)	84	12.71
5	Thyroid (C73)	42	6.35
6	Lymph Nodes –Primary (C77)	32	4.84
7	Lymph Nodes –Secondary(C77)	24	3.63
8	Urinary Tract (C64-68)	22	3.33
9	Skin (C44)	22	3.33
10	Other Sites	88	13.31
	Total	661	100

(All sites C00-C96)

The table (5) - gives the ten leading sites of cancer, for both male and female in the year of 2007. The system wise predominant cancer sites during 2007 was cervix (C53.9) and it is the first leading cancer site (134 cases,20.27%), followed by head & neck (C00 to C14.2) (107cases,16.19%), breast(C50.9) (106cases,16.04%), GIT(C15-C26) (84cases,12.71%), thyroid(C73.9) (42cases,6.35%), lymph node(C77.9), (both primary4.84% and secondary3.63%), urinary tract (C64-C68) (22cases,3.33%), skin (C44.9) (except labia majora, vulva, penis & scrotum)(22cases,3.33%) & other sites(C00-C96)(13.31%).

Table.6.The top ten leading cancer sites for 2008, both male and female

RANK	SITE	NO OF CANCERS	%
1	Cervix (C53)	144	21.33
2	Head & Neck (C00-14,C30-32)	124	18.37
3	Breast (C50)	111	16.44
4	GIT (C15-C26)	90	13.33
5	Thyroid (C73)	38	5.63
6	Urinary Tract (C64-68)	26	3.85
7	Male Genital Tract (60-63)	22	3.26
8	Lymph Nodes- Primary(C77)	19	2.82
9	Lymph Nodes- Secondary (C77)	17	2.52
10	Lung (C34.9)	15	2.22
	Other Sites	69	10.23
	Total	675	100

(All sites C00-C96)

The table (6): gives the ten leading sites of cancer, in both male and female in the year of 2008. The system wise predominant cancers sites during 2008 was cervix (C53.9), it is the most leading cancer site (144cases,21.33%), followed by Head & Neck (C00 TO C14.2) (124cases,18.37%), breast (C50.9) (111cases,16.44%), GIT (C15-C26) (90cases,13.33%), thyroid (C73.9) (38cases,5.63%), urinary tract (C64-C68)(26cases,3.85%), MGT(C63.9) (22cases,3.26%), lymph nodes primary (C77.9)(19cases,2.82%), lymph nodes secondary (17cases,2.52%), lung (C34.9) (15cases,2.22%) and other sites (80cases,11.85%).

Table.7.The top ten leading cancer sites for 2009, both male and female

RANK	SITE	NO OF CANCERS	%
1	Head & Neck (C00-C14& C30-32)	188	22.46
2	GIT (C15-C26)	124	14.81
3	Cervix (C53)	122	14.57
4	Breast (C50)	101	12.06
5	Thyroid (C73)	46	5.50
6	Skin (C44)	28	3.35
7	Male Genital Tract(C60-63)	27	3.23

8	Lymph Node- Primary(C77)	25	2.99
9	Lymph Node- Secondary(C77)	23	2.75
10	Lung(C34.9)	23	2.75
11	Hematopoietic(C42)	20	2.39
	Other Sites	110	13.14
	Total	837	100

(All sites C00-C96)

The table (7) - gives the ten leading sites of cancer, in both male and female in the year of 2009. The system wise predominant cancer sites during 2009 were head & neck (C00 TO C14.2) (188cases, 22.46%), followed by GIT (C15-C26) (124cases,14.81%), cervix (C53.9) (122cases,14.57%), breast (C50.9) (10lcases,12.06%), thyroid (C73.9) (46cases,5.50%), skin (28cases,3.35%), MGT (C63.9) (27cases,3.23%), lymph nodes primary (C77.9)(25cases,2.99%), lymph nodes secondary (23cases,2.75%), lung (C34.9) (23cases,2.75%), hematopoietic system(C42) (20cases,2.39%) and other sites (110cases,13.14%).

RANK	SITE	NO OF CANCERS	%
1	Head & Neck (C00-C14,C30-33)	279	30.03
2	Breast (C50)	125	13.46
3	Cervix (C53)	112	12.05
4	GIT (C15-C26)	77	8.29
5	Thyroid (C73)	45	4.84
6	Lymph Node- Primary(C77)	38	4.09
7	Lung (C34.9)	36	3.88
8	Male Genital Tract (C62-C63)	33	3.55
9	Lymph Nodes –Secondary (C77)	29	3.12
10	Skin (C44)	25	2.69
	Other Sites	130	14.00
	Total	929	100

Table.8.The top ten leading cancer sites for 2010, both male and female

(All sites C00-C96)

The table (8): gives the ten leading sites of cancer, in both male and female in the year of 2010. The system wise predominant cancer sites during 2010 were head & neck(C00 to C14.2) (279cases,30.03%), followed by breast (C50.9) (125cases,13.46%), cervix(C53.9) (112cases,12.05%), GIT (C15-C26) (77cases,8.29%), thyroid(C73.9) (45cases,4.84%), lymph nodes primary(C77.9) (38cases,4.09%), lung(C34.9) (36cases,3.88%), MGT(C63.9) (33cases,3.55%), lymph nodes secondary(29cases,3.12%), skin(25cases,2.69%), and other sites (130cases,14%).

Table.9. The top Ten leading cancer sites for 2011, both male and female

RANK	SITE	NO OF CANCERS	%
1	Head &Neck(C00-C14.2)	347	32.74
2	Cervix(C53)	141	13.30
3	GIT(C15-C26)	118	11.14
4	Breast(C50)	116	10.94
5	Thyroid(C73)	62	5.85
6	Lymph Nodes Primary(C77)	41	3.87
7	Lung(C34.9)	38	3.58
8	Male Genital Tract(C62-C63)	37	3.49
9	Urinary Tract (C64-C69)	26	2.45
10	Hematopoietic System (C42)	26	2.45
	Other Sites	108	10.19
	Total	1060	100

(All sites C00-C96)

The table (9)- gives the ten leading sites of cancer, in both male and female in the year of 2011. The system wise predominant cancer sites during 2011 were head & neck (C00 TO C14.2) (347 cases,32.74%), followed by cervix (C53.9)(141cases,13.30%), GIT (C15-C26) (118cases,11.14%), breast (C50.9) (116cases,10.94%), thyroid (C73.9) (62cases,5.85%), lymph node -primary (C77.9)(41cases, 3.87%), lung (C34.9) (38cases, 3.58%,) MGT (C63.9)

(37cases, 3.49%), urinary tract (26cases, 2.45%), hematopoietic system (26cases, 2.45%) and other sites (108cases, 10.19%).

Table -10: Comparison of cancer sites among adults between gender

SITE	No Of Cancers In Male	No Of Cancer In Female	Total No Of Cancer	Male : Female Ratio
Cervix(C53)	-	653	653	-
Head& Neck(C00-C14.2)	715	317	1032	2.2:1
Breast(C50)	15	544	559	1:36
GIT(C15-26)	275	217	492	1.3:1
Thyroid(C73)	58	174	232	1:3
Lymphnode Primary(C77)	73	46	119	1.6:1
LymphnodeSecondary(C77)	77	33	110	2.3:1
Urinary Tract(C64-C68)	77	24	101	3.2:1
Male Genital Tract(62-C63)	134	-	134	-
Lung(C34.9)	95	24	119	4:1
HematopoieticSystem(C42)	34	18	52	1.9:1
Skin(C44)	54	42	96	1.3:1
Other Sites	183	200	383	

(All sites C00-C96)

The above table (10) shows the comparison between male and female cancer incidence sites, which revealed that statistically breast cancer among the female (23.7) was significantly greater than males (0.8) (M:F-1:36). Cervical cancer was exclusively among the females. Male genital tract cancers were exclusively among males. Statistically the following sites of cancer such as head& neck(M:F-2.2:1), gastrointestinal tract(M:F-1.3:1), lymph node primary(M:F-1.6:1), lymph node secondary(M:F-2.3:1),urinary tract(M:F-3.2:1), lung(M:F-4:1), skin(M;F-1.3:1), and hematopoietic system (M:F-1.9:1) among males was significantly greater than that of females(P<0.001).The incidence of thyroid cancer among females was statistically significantly greater than that of males (M:F-1:3) (P<0.001).

Table-11. Comparison of cancer sites between adults and Children, 2007-2011

Site	Adult		Children		Z	Significance
	No	%	No	%		
Adrenal& parasympathetic ganglion	3	0.1	2	2.5	-	-
Hematopoietic system	52	1.4	20	25.2	4.892	P<0.001
Brain	11	0.4	2	2.5	1.259	P>0.05
GIT	492	12	2	2.5	-	-
Kidney	17	0.4	7	8.8	1.745	P>0.05
Lymph nodes-primary	119	2.9	36	45	6.09	P<0.001
Head and neck	1032	25.2	3	3.2	0.044	P>0.05
Ovary	77	1.9	3	3.7	0.172	P>0.05
Skin	96	2.3	1	1.2	0.088	P>0.05
Thyroid	229	5.6	1	1.2	0.352	P>0.05
Others	1954	47.9	3	3.7		
Total	4082	100.0	80	100		

The cancer sites of adults and children were compared in the above table- (11). Statistically the hematopoietic malignancy (25%) and lymph nodes primary (39%) were significantly more among children, than adults (P<0.001). Nearly three fourth of the children were presented with hematopoietic malignancy and malignant lymphoma. The incidence of cancer in other sites among the children is statistically not significant when compared with adults.

Table: 12- Observed ten leading cancer sites from 2007 to 2011.

Site	2007	2008	2009	2010	2011	TOTAL
Head &Neck	107	113	188	279	347	1034
Cervix	134	144	122	112	141	653
Breast	106	111	101	125	116	559
GIT	84	90	124	77	118	493
Thyroid	42	38	46	45	62	233
Lymph Nodes- Primary	32	19	25	38	41	155
MGT	15	22	27	33	37	134

Lung	7	15	23	36	38	119
LymphNodes- Secondary	24	17	23	29	17	110
Urinary Tract	22	26	15	19	26	108
Others	88	80	143	136	117	564
Total	661	675	837	929	1060	4162

Table (12) showed that head and neck cancer constitute predominant numbers 24.84%(1034 cases), followed by cervix -15.69%(653 cases), breast-13.43%(559cases), GIT-11.85%(493cases), thyroid-5.6%(233 cases), lymph node primary-3.72%(155 cases), male genital tract-3.22%(134 cases), lung-2.86%(119 cases), lymph node secondary-2.64%(110 cases), urinary tract-2.60%(108 cases) and others-13.55%. Table (12) depicts the ten leading cancer sites (2007-2011)showing that, during the period of 2007 to 2008 cervix was the most commonly affected cancer site followed by head and neck, breast, thyroid, GIT and others. During the period of 2009-2011 head and neck is the most common leading site followed by all others including cervix, breast, GIT and other sites.

Comparative analysis of four leading common cancer sites for the period of 5 years (2007-2011):
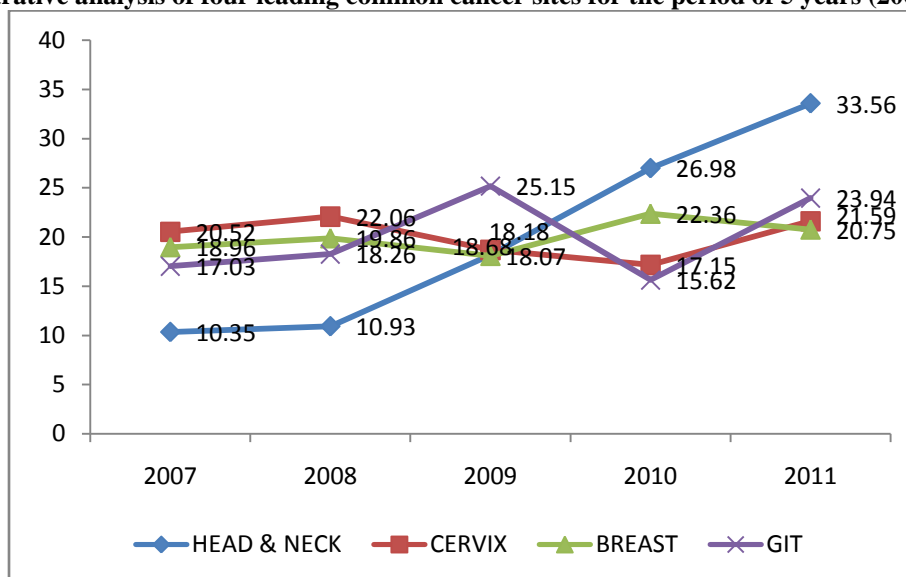
Fig: 2. The four most common cancer sites for the period of five years, 2007 to 2011.

The above fig-(2) depicts the four leading cancer sites for five year period (from 2007 to 2011). The head and neck cancers shows dramatically increasing trend from 2007 to 2011, which is the most common cancer site for past three year duration in our study. The breast cancer shows gradual increase in trends throughout the five years. The cervical and GIT cancers were fluctuating from 2007 to 2011.
 Observed incidence of other sites such as thyroid, lymph node primary, MGT, and lung cancers were gradually increasing trend from 2007 to 2011. The new emerging cancer site was gall bladder, which also showed the same increasing trend from 2008 -2011.

IV.   Discussion
        This study broadly analyzed the incidence, age, sex, and system wise distribution of cancer presented at our tertiary care centre over a period of five years from 2007 to 2011. The cancers were classified as per The International Classification of Disease for- Oncology (WHO loc. cit 2000)[5].
        Cancer is the common cause of mortality in developed countries and the second common cause of mortality in developing countries (WHO loc.cit 2009b) [6]. The purpose of HBCRs is concerned with collection of information about the cancer cases seen in a particular hospital. Within the hospital, a registry is considered to be an integral part of hospital cancer programme. The information in this form chiefly consists of patient's identification, diagnosis, treatment, clinical staging and demographic information and to ensure the follow up of the patients on the regular basis (J.L. Young HBCRs 1991)[7].
        PBCRs data's may be used to monitor the distribution of advanced stage of cancers and their pattern, in which the strategy for early diagnosis is utilized for controlling the disease progression. The PBCR plays an

essential role in the improvement of patient care programs. Linkage services of this type of cancer registries for health care providers deliver a cost-effective source of data which are needed for clinical programs, such as i) Follow-up results of a screening program (particularly breast), ii) Data's pertaining to the stage of diagnosis, iii) Data's related to treatment selection is obtained for monitoring the guidelines for clinical treatment and their utilization (Nandakumar A et al 1990-1996)[8].

The biggest benefit of ICD-O classification dedicated entirely to oncology is that it helps tackle the serious issue of cancer in a much more efficient manner than before. The International Classification code provides a common platform for researchers and oncologists from all over the world to discuss and share the research information which helps to identify the cause of cancer in a big way. Further, owing to the classification, oncologists now have a more precise way of knowing whether a tumour is benign or cancerous. This precise distinction itself is the biggest step towards planning and initiating treatment (WHO loc.cit 2000)[5].

It is more beneficial if patient needs to be treated in other countries, since the basis for diagnosis will be the same everywhere. The various factors that are taken into consideration for preparing the classification provide a better platform for more definite diagnosis. This classification is more modern and encompasses a lot of modern research that the previous versions were lacking in, thus making it the perfect international benchmark for all oncology studies (WHO loc. cit 2000)[5].

About 12.7 million cases were estimated to have occurred in 2008 worldwide (Globocan 2008) [9]. In the year of 2009, Around 320500 cancer cases were diagnosed in UK, this equates to about 519 patients per 100 000 people every year (UK stats loc. cit 2012)[10]. In India the total number of cases in 2004 were 819354, of these 47.7% (390809 cases) were male and 52.3% (42854 cases) were female. This present study also shows similar results out of which 4162 cases were diagnosed as cancer in the five year period from 2007 to 2011, 56% were females and 44% were males.

In European study, 56% cases were found to be in the age group of >65 years. Another study which was conducted in UK, showed that more than 3 out of 5 newly diagnosed cancer patients were in the age group of 65 or more, (UK stats loc. cit 2012)[10]. In contrast to this, the present study reveals that only 25% of people with cancer were above 65 years of age. Another study conducted in Mumbai cancer registry showed that people in the age group 65 years and above contributed to about 35.5% of the total cases, which also contradicts our present study (25%).

In the year 2008, about12.7 million cancer cases were diagnosed globally , in which 52% of the total cancer cases were males and 48% were females (Goodarz Danaei 2012)[11] (Globocan loc.cit 2008) [9]. This contradicts our study in which we observed in the five year period from 2007 to 2011 that totally 56% cases with cancers were female and 44% cases with cancers were male. Another study which was conducted in Mumbai 2006, showed that there were totally 11033 new cases registered for the year 2006, of these 48.5% were males and 51.5% cases were females (A.P. Kurkure et al 2006)[12], this study more or less correlated with our study that females (56%) were most commonly affected than males (44%).

Lung cancer is the foremost cancer among both the genders contributing nearly 13percent of the total cancer cases estimated globally in the year 2008. The second most common cancer is the Breast cancer contributing nearly 1.4 percent cases in 2008. In the same year cancer colorectum ranked the third with over 1.2 million cases of cancers diagnosed (Globocan loc.cit 2008) [9]. This study challenged our present study in which we observed that the head and neck cancer is the most common cancer followed by cervical cancers (female), breast cancers (female), gastrointestinal tract cancers and thyroid cancers among both sexes.

In Mumbai 2006, as far as total cases were concerned in males, the lung cancer was found to have higher incidence followed by lymphomas, mouth cancers, prostate cancers and tongue cancers. In females the breast cancers ranked first in incidence followed by cervical cancers, ovarian cancers, lung cancers and leukemia's (A.P. Kurkure et al loc.cit 2006)[12]. Our present study states that the head and neck cancer leads first among males followed by gastrointestinal cancers, male genital tract cancers and lung cancers. In females, cervix is the most common cancers followed by breast, gastrointestinal tract and thyroid. Male preponderance was observed at all sites except breast, thyroid and gallbladder cancers (A.P.Kurkure et al loc.cit 2006)[12]. This correlated with our present study.

In Chennai, most commonly observed cancers were breast followed by cervix, lung and stomach, (R. Swaminathan et al loc.cit 2011)[13]. This contradicts our present study in which we observed head and neck cancers are the most common cancers followed by cervix, breast and thyroid.

ICMR study (1982-2005) has shown that there was an increased incidence of breast cancer (Imran Ali et al loc.cit 2011)[14]. Similarly, our present study showed that the incidence of breast has increased from 19% (2007) to 21% (2011). Another study conducted by Swaminathan et al, 2011, showed increased incidence of breast cancer as

registered by cancer registries from 1982 to 2006 (R. Swaminathan et al loc. cit 2011)[13]. Similarly, this present study observed an increased incidence of breast cancer from 2007(19%) to 2011(21%).

In 1988, Delhi cancer registries reported around 25.9% of cervical cancers per 100 000 populations, which reduced to 19.1percent in the year1998 and further declined to 18.9 percent in 2005 (A.P. Kurkure et al loc.cit 2006)[12]. In contrast, this present study showed a marginal raise in the occurrence of cervical cancer from 20.5% to 21.6% over a five year period (2007-2011).

The Chennai cancer registries report that there is a reduction in the incidence of cancer cervix from 41% of patients /100000 populations in 1982, to 33.4 percent in 1991 and has been further declined to 20.0 percent in 2005 (R. Swaminathan et al loc.cit 2011)[13]. In contrast, our present study revealed marginal increase in incidence from 20.5% (2007) to 21.6% (2011).

The head and neck cancers, tongue cancers and laryngeal cancers showed an increasing incidence from 1982 to 2006 in consistent with the Chennai cancer registry reports (R. Swaminathan et al 2011)[13]. Similarly, this present study observed that the incidence of head and neck cancers especially tongue and laryngeal cancers were increasing from 2007 to 2011.

Study which was conducted by Swaminathan et al (2011)[13], showed that the incidence for oral cancers (excluding tongue) were decreasing from 1982 to 2006. In contrast, this present study revealed an increased incidence from 2007 to 2011.

Other cancers such as leukemia, lung cancers and GIT cancers (colorectal) have increased in incidence from 1982 to 2006 (R.Swaminathan et al 2011)[13]. Similarly this present study showed an increased incidence of the above cancers in the five year period (2007- 2011). Ovarian cancer and lymphomas have increased in incidence from 1982 to 2006 in Chennai cancer registries (R. Swaminathan et al 2011)[13]. In contrast, this present study showed an increased incidence from 2007 to 2010 followed by decreased incidence in 2011.

In our present study, the incidence of skin cancer, bone cancer and vulval cancers were significantly decreasing in the last five periods (2007 to 2011). Few cancers were maintained the plateau state from 2007 to 2011, which includes endometrial cancers, testicular cancers, bladder cancers and renal cancers.

V.   Summary And Conclusion

Our study analyzed the total incidence of cancer in Tirunelveli Medical College and Hospital for a period of five years from 2007 to 2011 and classified based on International Classification of Disease for Oncology. This study highlighted the importance of cancer surveillance and ICD-O classification.

The biggest benefit of ICD-O classification dedicated entirely to oncology is that it helps to tackle the serious issues of cancer in a much more efficient manner than before. The International Classification code provides a common platform for researchers and oncologists from all over the world to discuss and share the research information which helps to identify the cause of cancer in a big manner.

Our study concludes that there is significant increase in cancer incidence from base to end (2007 -2011). The incidence of cancer cases increased by 9.6% totally from base to end. This increase was steady and statistically very highly significant (P<0.001). The incidence of cancer among the males were increased by 11.6% and this increase was statistically very highly significant (P<0.001). The incidence among females, were fluctuating from 62.5% (2007) to 51.4% (2011) and this fluctuation was also statistically significant (P<0.001).

The mean age of cancer incidence among the males and females were 56.9± 12.9 and 52.2 ± 18.3.The difference of mean age between males and females was statistically significant (P<0.001). Comparison between the genders revealed that females had a higher incidence of breast cancer (23.7%) compared to males (0.8%) which is statistically significant. Whereas males had greater incidence of cancer in the following sites, such as head and neck, GIT and urinary bladder when compared to females which is statistically significant (P<0.001). The incidence of thyroid carcinomas among females which is greater than that of males is statistically significant (P<0.001).

The increasing trends of cancer sites were head and neck, breast, GIT, thyroid, kidney, lymphoma, leukemia, ovary and male genital tract. The fluctuating incidence was noted in the cancer cervix and urinary bladder.

To conclude, our study helps to generate a data about the magnitude and pattern of cancer and helps to undertake epidemiological studies based on these results. In addition, it will help in diagnosing, planning, monitoring and evaluation of cancer control activities.

The ICD-O is a dual classification with coding systems for both morphology and topography. The topography code demonstrates the site of origin of the tumours thereby it increases specificity for coding sites of benign tumours. The morphologic code demonstrates the cell type of the tumour and its biological behaviours. The special topography codes describe the primary malignant tumours according to their origin of tissues/organ. Behaviour code is essential to identify the neoplasms as benign, insitu, primary or secondary.

This ICD- O coding helps to face the serious issues of cancer in a much more competent manner and this code helps the researchers and oncologists worldwide to converse and contribute the research information in identifying the cause of cancer in a big way. Further, owing to the classification, oncologists now have a more precise way of knowing whether a tumor is benign or cancerous. This precise distinction itself is the biggest step towards planning and initiating treatment.

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