Original Research Article

A record based retrospective analysis of cancer burden at a tertiary care hospital in south India

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Abstract

Background: Cancer pattern varies across geographical areas, depending on the race, lifestyle, diet, environment and genetics govern relative incidence. Analysis of cancer pattern is an important basis for determining the priorities of cancer control in any population group. **Objectives:** Objectives of the study is to conduct a record based retrospective analysis to assess the leading sites and to analyse the patterns of cancer by age, gender, site and histopathological type that were reported in the tertiary care centre of this area. **Methods:** A retrospective analysis was done from the pathology section records for a period of four years at a tertiary care hospital attached with medical college. The collected data was segregated and represented in tables. **Results:** Out of 243 cancer diagnosed cases, the leading site of cancers was head and neck in males, whereas in females, the most common site involved being breast followed by cervix. In total cancer cases reported, the most common histopathological type of cancer diagnosed was squamous cell carcinoma followed by infiltrating duct cell carcinoma of breast. **Conclusion:** Based on our study analysis, the most common site of cancer reported was head and neck, followed by gastrointestinal tract. We conclude that tobacco and alcohol related cancer predominated among all the sites. Greater effort needs to be made to curtail tobacco, smoking and alcohol addiction to bring down the incidence of cancers of organs like head and neck, oesophagus. Screening programmes should be planned for their early detection.

Keywords: cancer, histopathological profile, squamous cell carcinoma, screening

Introduction

Cancer is the second most common disease after cardiovascular diseases. As one of the most dreaded non-communicable diseases, cancer contributes to the global burden of diseases[1]. In the world, 71% of total deaths were contributed by non communicable diseases (NCDs). In India, 63% of all deaths were estimated to be due to NCDs and cancer was one of the leading causes for NCDs[2].

Globally, an increasing trend in cancer mortality was noted with an incidence of 19.3 million cases and mortality of 10 million in 2020 as depicted in Recent Global Cancer Observatory (GLOBOCAN) data[3]. In India, the most common cancer sites in men were reported to be oropharynx, stomach, lung and oesophagus. Whereas, in women, the common sites of cancer were cervix, breast, stomach and esophagus[4,5].

Approximately 70% of the cancers can be potentially preventable through modifiable common risk factors[6]. Patterns of cancer vary from region to region. Urbanization, reproductive patterns, unhealthy lifestyle, and an increase in life expectancy resulted in an increase in the burden of cancer[7]. Identification and modification of common risk factors like tobacco-control measures as well as early detection through screening methods may alter the pattern of cancer in a particular region[8]. The present study aims to determine the leading types of cancers in both genders that were reported to the particular tertiary care hospital in this region and also their associated risk factors wherever possible.

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Materials and Methods

A record based retrospective study of 4 years duration from January 2017 to December 2020 was conducted in the tertiary care hospital of a rural area in South India.

Inclusion criteria

1. All the cancer cases reported and recorded in the histopathology section of Pathology department from 1st January 2017 to 31st December 2020 were included in this study.

Exclusion criteria

1. Patients with all haematological malignancies were excluded from the study.
2. Patients operated at other Hospitals but whose histopathological slides reviewed in this hospital were also excluded from the study.
3. All the cases lacking the relevant information or adequate confirmation of diagnosis were excluded.

The following required information was retrieved from the records

1. Age of the patient

2. Gender of the patient
3. Address of the patient
4. History of any addiction
5. Site of the tumor
6. Complete histopathological evaluation

A detailed gross examination of tissue specimens was done followed by histopathological analysis. The cases were segregated on the basis of age, gender, system, site and histopathological diagnosis. No statistical analysis, only percentages taken. The present study findings were compared with similar studies.

Ethical clearance for conducting the study was obtained from the Ethical Clearance Committee of the institute.

Results

A total of 243 malignancies were reported in the histopathology section of pathology department during the period of 2017 to 2020.

Out of which females accounted for 130 cases (53.49%) and males for 113 cases (46.51%) with M: F of 0.87:1 indicating the female preponderance. (Table1)

In the present study the entire cancer cases were grouped into the age distribution intervals of 0 to 18 years (children and adolescent), 19 to 39 years (young adult age group), 40 to 55 years (mid adult age group), 56 to 65 years (older adult age group) and >65 years(elder age group).

Maximum number of cases (39.5%) were reported in the age group of 40-55 years, followed by age group of >65 years (23.9%). In males maximum number of cancer cases were noticed in the age group of >65 years. In females predominant age group of cancer prevalence reported was 40-55 years. (Table 1)

Table 1: Age and gender wise distribution and percentage

Age	Male	Female	Total	Percentage
0 - 18	2	1	3	1.20
19 - 39	15	18	33	13.6
40 - 55	30	66	96	39.5
56 – 65	31	22	53	21.8
>65	35	23	58	23.9
Total	113(46.51%)	130(53.49%)	243	100

In our study the entire cancer cases were grouped into twelve different systems based on the site of origin of the carcinoma. (Table 2)

Table 2: System and gender wise distribution and percentage

S. no	System	Male	Female	Total no. of cases	Percentage %
1.	Central nervous system	3	2	5	2.06
2.	Lymph node	3	4	7	2.88
3.	GIT	18	13	31	12.76
	a) Esophagus	2	5	7	2.88
	b) Stomach	13	3	16	6.60
	c) Small intestine	1	2	3	1.23
	d) Large intestine	2	3	5	2.05
4.	Reproductive system	9	31	40	16.43
	MGT				
	a) Penis	6		6	2.46
	b) Prostate	2		2	0.82
	c) Testis	1		1	0.41
	FGT				
	a) Cervix		17	17	6.99
	b) Uterus		5	5	2.05
	c) Ovary		4	4	1.65
	d) Vagina		5	5	2.05
5.	Head and neck	35	15	50	20.59
	a) Head & neck	14	7	21	8.64
	b) Oral cavity	17	7	24	9.90
	c) Salivary gland	4	1	5	2.05
6.	Musculoskeletal system, soft tissue and skin	16	12	28	11.52
	a) Skin				
	b) Muskulo skeletal and soft tissue	12	9	21	8.64
		4	3	7	2.88
7.	Urinary system	10	1	11	4.53
	a) Kidney	4	0	4	1.65
	b) Urinary bladder	6	1	7	2.88
8.	Respiratory system	4	2	6	2.46
9.	Breast	0	31	31	12.75
10.	Endocrine system	9	15	24	9.90
11.	Eye	0	1	1	0.41
12.	Other & unspecified primary sites	6	3	9	3.70
	Total	113	130	243	100

Of the total malignancies, head and neck cancers constituted the highest number of 50 cases (20.59%). Out of these, 35 cases were males and 15 were females, depicting male predominance. Majority of them were reported from the oral cavity. The common age group diagnosed was in between 40-55 years followed by >65 years. (Table 3)

Table 3: System wise and age group distribution of total cancers

S .no	System	Age					Total
		0-18	19-39	40-55	56-65	>65	
1.	Central nervous system	1	0	2	2	0	5
2.	Lymph node	1	1	3	2	0	7
3.	GIT	0	1	14	10	6	31
4.	Reproductive system						
	a) MGT	0	2	2	2	3	9
	b) FGT	0	3	16	8	4	31
5.	Head and neck	0	8	19	9	14	50
6.	Musculoskeletal system, soft tissue and skin	0	1	13	4	10	28
7.	Urinary system	1	0	2	5	3	11
8.	Respiratory system	0	0	2	2	2	6
9.	Breast	0	5	13	5	8	31
10.	Endocrine system	0	10	6	3	5	24
11.	Eye	0	0	1	0	0	1
12.	Other & unspecified primary sites	0	2	3	1	3	9
	Totals	3	33	96	53	58	243
	Percentage %	1.23	13.58	39.51	21.81	23.87	100

The second largest group of cancers was constituted by reproductive system with 40 cases (16.43 %) out of 243 cases. Majority of these cases were reported in female reproductive system which constituted 31 cases. More number of cases were reported in cervix. Most common age group for reproductive malignancies was noted in 40-55 years.

The third largest group of cancer cases were reported from Gastro intestinal tract and breast. In 31 cases of gastro intestinal carcinomas, stomach constitutes more number with 16 cases and also depicted male preponderance. Of the total 31 cases of breast malignancies, all the cases were reported in females and most of them were reported in the age group of 40-55 yrs.

Patterns of cancer noted were different in the males and females. In males, maximum no. of cases was from head and neck with 35 cases (14.40%), out of 243 cases followed by gastrointestinal tract cancers with 18 cases (7.40%).

In females, out of total cancers, maximum number of cases reported were in breast with 31 cases (12.75%), followed by cervix with 17 cases (6.99%) and thyroid with 15 cases (6.17%) out of total malignancies.

In our study, main site of cancer in the endocrine system reported was thyroid with 24 cases (9.90%) out of total 243 cases. Maximum cases were reported in females with 15 cases out of total thyroid cancers. The common age group affected was 19-35 yrs age.

In musculoskeletal, soft tissue and skin system, out of 28 cancer cases, a total of 21(8.64%) cases of skin and adnexa malignancies were reported in the present study. In this, majority number of cases was reported as squamous cell carcinoma, followed by malignant melanoma.

Malignant lesions of kidney and lower urinary tract constituted 11 cases (4.53%) out of total cancer cases diagnosed.

Secondaries, Other & unspecified primary sites carried 3.70 % (9 cases) of total cancers in the current study, with 6 cases in males and 3 in females. The common site where secondary deposits diagnosed was lymph node (77.7% of total secondary deposits).

Tumors of lymphoreticular system had 7 cases (2.88%) out of total cancer cases reported.

Respiratory system malignancies reported were 6 cases (2.46%) out of 243 total cancers. Maximum number of cases was noted in males.

Malignancies of Central nervous system constituted 5 cases (2.06%). The age groups affected were 40-55 years and 56-65 years.

In the present study, histopathological evaluation of total malignancies revealed Squamous cell carcinoma to be the predominant microscopic pattern constituting 93 cases (38.27%) out of 243 total cancers. Most of the cases were reported from head and neck and oral cavity (41 cases), followed by the reproductive system (28 cases), skin (14 cases), esophagus (7 cases), and remaining from other sites. Second most prevalent microscopic pattern reported in our study was Infiltrating duct cell carcinoma (IDCC) of breast with 23 cases out of total malignancies.(Table 4)

Table 4: system wise predominant microscopic patterns

S. No.	Organ/ System	Predominant Microscopic Pattern (%)
1.	Central nervous system	Astrocytomas (60%)
2.	Lymph node	Non Hodgkin's lymphomas (71.4%)
3.	GIT	Adenocarcinoma (64.5%), SCC (25.80%)
4.	Male reproductive system	SCC of penis (66.6%)
5.	Female reproductive system	SCC of cervix and vagina (70.96%)
6.	Head and neck	SCC (82%)
7.	skin	SCC (66.6%), melanomas (19.04%)
8.	Urinary system	Invasive urothelial carcinoma (54.5%)
9.	Respiratory system	Adenocarcinoma (50%), SCC (33.3%)
10.	Breast	Infiltrating duct cell carcinoma (74.19%)
11.	Endocrine system	Papillary carcinoma of thyroid (66.66%)

SCC – Squamous cell carcinoma.

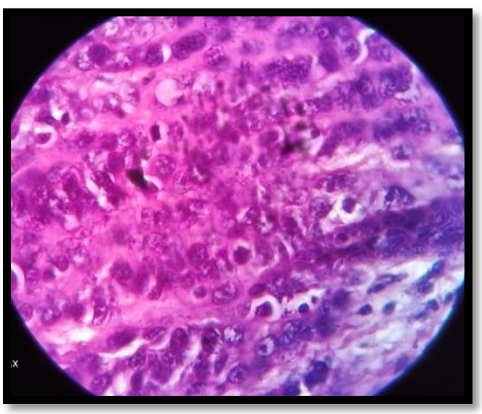

Figure 1

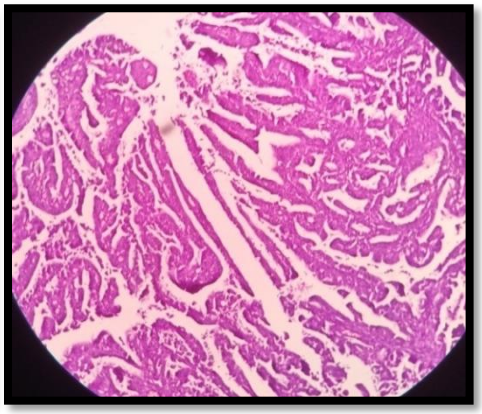

Figure 2

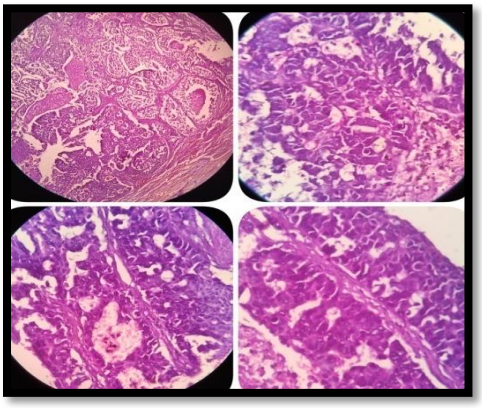

Figure 3

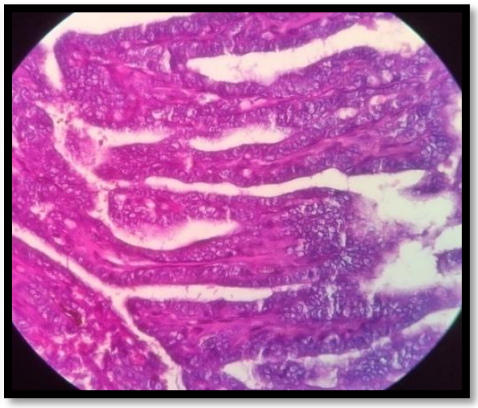

Figure 4

Figure 1: Undifferentiated Sarcomatoid carcinoma (HPE 40X); Figure 2: Papillary adenocarcinoma of stomach (HPE 40X); Figure 3: Duct cell carcinoma of breast with comedo, cribriform, papillary patterns (HPE 40X); Figure 4: Papillary carcinoma of thyroid (HPE 40X)

Discussion

The present study was a record based retrospective analysis carried out in the department of pathology, Katuri medical college and hospital for a period of four years. We have received tissue specimens from various surgical and medical specialities and super specialities. The specimens were subjected to histopathological examination.

The present study depicted the leading sites of cancer, gender distribution, age distribution, and foremost histopathological subtypes.

In our study, a total of 243 cases were diagnosed as malignancies. Out of these, females accounted for 130 cases (53.49%) and males for 113 cases (46.51%). The male to female ratio was 0.87:1, in which the female preponderance was noted. The reason being, most of the cases contributed by breast cancers and cervical cancers. Also, maximum number of thyroid cases were reported in females.

Similar female preponderance was noted in studies done by Bhagyalakshmi A et al[9] with 55.9% cancer cases reported in females and 44.03% cases in males, Aggarwal R et al[10] with 60.9% in female patients, Hussain MA et al[11] with 52.8% female preponderance, Sharma MK et al[12] with 50.5% in female patients and Talukder MH et al[13] too reported 57.1% of female preponderance in total cancer patients.

The most common cancers noted in our study were of the head and neck, oral cavity with 50 cases (20.59%), reproductive system with 40 cases (16.43%), GIT and breast each accounting 31cases (12.76%) out of 243 total cancer cases.

As per the report of NCRP 2016 and GLOBOCAN 2020, an extraordinary increase in head and neck carcinoma was detected in the Indian population[3]. Our data also showed head and neck, oral cavity cancer as the most common carcinoma in the present study region. This result was similar to the study done by Deshpande Jayant D et al where oral cavity cancers (32.29%) were the most frequent cancers diagnosed in men[14].

In the region of our study, reverse smoking, especially chutta, oral snuff, betel quid, or pan with tobacco, along with alcohol, were noted as the more common risk factors, especially in the lower socioeconomic class. Human papillomavirus (HPV) infection is also a factor causing oral cancer. It is estimated that the increased risk of oral / laryngeal cancer is 2.4 times in women with a history of *in-situ* or invasive cervical cancer[15].

In the reproductive system, out of 40 cases, 31 cases were of female reproductive system and 9 cases were in males. Maximum number of cases were noted in cervix with 17 cases (6.99%) out of 31 total number of female genital tract cancers.

The risk factors contributing for the cancer incidence in the cervix were early marriages, multiple partners, infection with HPV, and lack of genital hygiene[16].

As per 2020 updated guidelines from the American Cancer Society, cervical cancer screening should be initiated in women at age 25 years and should undergo primary HPV testing every 5 years through age 65 years[17].

Third most common system of cancers was gastrointestinal tract, GIT with 31 cases (12.76%). Of these, maximum number of cancers were reported in stomach with 16 cases (51.61%), followed by esophageal cancers with 7 cases (22.58%). Male preponderance was noted in stomach cancers. This was similar to the study done by

Bhagyalakshmi et al where majority of cancer cases in GIT were from stomach (39.95%) followed by oesophagus (22.55%)[9].

In south India, where carbohydrate rich diet is the staple food, carcinoma stomach is one among the top cancers. In this particular region, along with carbohydrate rich diet, increased intake of salt, spicy food and preserved food is noted. Also, there is decreased intake of protective micronutrients such as Vitamin C, Vitamin E, and tocopheral which cause the increased risk of stomach cancer[15].

In the present study a majority of esophageal cancers were squamous cell carcinoma, which could be attributed to an increased use of alcohol and tobacco. Eighty percent of esophageal cancer in developing countries is squamous cell carcinoma and is associated with smoking, alcohol, malnutrition, use of hot beverages, betel nut chewing, along with decreased intake of fresh fruits and vegetables[15].

In females, the leading sites of cancer cases reported were from breast (12.75 %), followed by cervix (6.99%). These findings were similar to studies done by Bhurgri et al[18] and Sen U et al[19] who noted breast cancer as the most common cancer in females accounting for 22.4% and 22.7% respectively. Also in the studies done by Bal et al. (2015) and Sandhya et al. (2009), the most prevalent cancer was breast cancer (26.8% 30.3%) followed by cervical cancer (13%) in females[20,21]. Infiltrating duct cell carcinoma is the predominant microscopic pattern diagnosed in breast constituting 23 cases out of 31 total breast carcinomas.

According to GLOBOCAN 2020, the most common carcinoma in females was breast cancer with 11.7% of all cancers and also accounts for 1 in 4 cancer cases and for 1 in 6 cancer deaths in majority of countries[3]. The present analysis also depicted breast carcinoma as the leading site of malignancy in females. The exposures to estrogen for prolonged period due to late age marriage, nullparity, and late menopause have been linked to breast cancers as the risk factors. As per WHO guidelines for breast cancer, population based mammography screening for every 2 years is recommended to women at average risk aged 50-69 years[22].

Thyroid cancers contributed to one of the leading cancers in this region and maximum number of cases was diagnosed in females (15 cases) than males (9 cases). Histologically, majority of these cases were reported as papillary carcinoma of thyroid (PCT). As per the statistics of GLOBOCAN 2020, thyroid cancer is 3 fold higher in females than in males[3]. The incidence of thyroid cancer, particularly papillary thyroid cancer has been attributed to increased use of diagnostic imaging modalities like Ultrasonography has led to detection of subclinical and indolent lesions of thyroid that exist in general population[23]. Exposure to ionising radiation particularly in childhood is also a risk factor for thyroid cancer[24].

In musculoskeletal, soft tissue and skin system, out of 28 cancer cases a total of 21 malignancies were reported in skin and adnexa structures in the study. Male predominance was noted. The maximum cases were seen in age group of 40 – 55 years.

Tumors of the central nervous system (CNS) constitute approximately 2.06% of total cancers in the study. Astrocytomas being the predominant cancer reported in CNS. Study done by Madhavan R, also showed astrocytomas (52%) as the most common malignancy of CNS tumors[25].

The most common histopathological type reported in the present study was Squamous Cell Carcinoma (SCC) in 93 cancers (38.27%) out of total number of malignancies. In head and neck tumors (oral cavity, nasopharynx and larynx) 41 cases out of 50 cancers were reported as SCC. In reproductive system, the predominant microscopic pattern as SCC was diagnosed in cervix and penis. Kumari A et al. also observed SCC being the commonest histopathological type of cervical carcinoma in their study[26].

In skin the predominant histopathological pattern noted was SCC with 66.6%, out of total skin cancers. In concordance with the literature, the most common microscopic type of esophageal tumors reported was SCC.

Limitations

The present study being a hospital based study, the cases self reported to the hospital were only included. As the study cannot cover the entire population, the incidence and prevalence of individual cancers cannot be generalised to the population of the particular region. The leading sites of cancers in a given hospital is also dependent on patient's affordability, accessibility of a particular diagnostic or treatment facility, and popularity of a treating physician. Therefore, a population based studies are needed to validate the magnitude and pattern of cancer in this area.

Conclusion

The present study highlighted the different patterns of cancers in a tertiary care hospital. Overall, head and neck cancers were the most prevalent cancer which could be attributed to increased use of alcohol and tobacco. The most prevalent cancers in female were breast and cervix malignancies and maximum number of cases was observed in the age group of 45-56 yrs.

The present study gives the baseline data regarding the cancer profile, and its associated risk factors which helps to plan and promote cancer preventive screening programmes in this area.

More efforts needed for awareness of cancer pattern, knowledge on preventable risk factors and improving the quality of life may help to decrease the incidence of cancer in the study area.

Conflict of Interest

Nil

Source of support

Nil

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