A Retrospective Study on the Proportion of Different Types of Cancer in a Tertiary Care Hospital and their Distribution Across Various Age Populations

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ABSTRACT

This retrospective study focuses on analysing the distribution of different cancers in different age populations within a tertiary care hospital setting. This study is a hospital-based 6-month retrospective study involving 400 patients from the oncology department of Parumala Hospital. Data was collected with the help of case report forms which included Laboratory values, diagnosis, treatment, sex, age, and Naranjo scale to assess the adverse drug reactions experienced.

The study helps to analyse the prevalence and distribution of different types of cancer among different age populations. Data was collected from medical records of cancer patients from a specific period. Descriptive statistics and chi-square tests were used to assess the proportion of different cancer types among different age groups. Thus, the importance of the study includes the health burden of cancer patients, their role in treating complex cases, and the diverse patient population. The findings contribute to evidence-based practices in oncology, informing clinical decision-making, and public health policies. From the study, we were able to conclude that people in the age group of 61-70 had the highest number of cancer occurrences. The results showed that females were more prone to cancer by 56% when compared to males who had 44%. Different age groups showed vulnerability to different cancers, among which 21-30 had thyroid, osteosarcoma, and Leukemia by 33.33%, and age group 31-40 had more cases of thyroid cancer by 42.81% when compared to other cancers in the same age group, age group 41-50, were more prone to breast cancer by 20%, age group 51-60, breast cancer had the highest number of cases by 30.7%, age group 61-70 had more number of cases of breast cancer by 24.57%, age group 71-80, had more number of cases of breast cancer by 19.54%, age group 81-90 more number of cases of breast cancer by 25 %, age groups 91-100 had breast, rectal and oral cancers by 33.33%.

KEYWORDS: Cancer, treatment, adverse drug reaction, secondary reaction, vulnerability, metastasis

INTRODUCTION:

Cancer is indeed a complex and pervasive group of diseases characterized by the abnormal growth of cells that can invade surrounding tissues and spread to other parts of the body. This process, known as metastasis, is a major factor contributing to the severity and mortality associated with cancer. Cancer ranks as the second leading cause of death worldwide, responsible for an estimated 9.6 million deaths in 2018 alone. This translates to about one in six deaths globally being attributed to cancer. The types of cancer vary widely depending on gender. In males, common cancers include lung, prostate, blood (such as Leukemia), brain, lymph node (lymphoma), and liver cancers. Among females, breast, endometrial (uterine), and ovarian cancers are prevalent. Cancer exerts significant physical, emotional, and financial strain on individuals, families, communities, and healthcare systems. Managing cancer often requires comprehensive treatment strategies and supportive care, which can be costly and challenging to access, especially in low and middle-income countries. Access to timely and quality diagnosis, treatment options, and supportive care remains a critical issue for a large number of cancer patients worldwide.[1]

Carcinoma, Leukemia, lymphoma, sarcoma, multiple myeloma, melanoma, germ cell tumours, and neuroendocrine tumours are the different types of cancer. The early symptoms of cancer include Persistent cough or blood-tinged saliva, A change in bowel habits, Unexplained anaemia, Breast lumps or breast discharge, Lumps in the testicles, Change in urination, Persistent back pain, Unexplained weight loss, Stomach pain, and nausea.[2]

The pathophysiological process of cancer development involves a complex interplay of genetic mutations and disturbances in cellular processes, ultimately leading to the formation of malignant tumours.

- **Genetic Damage**: Cancer typically begins with genetic mutations or alterations in the DNA of cells. These mutations can arise from various factors such as exposure to carcinogens, genetic predisposition, or errors in DNA replication.

- **Gene Expression**: Disturbances in gene expression can lead to abnormal functioning of proteins involved in cell growth, differentiation, and apoptosis (cell death).

- **Tumor Promoter Genes**: Activation of oncogenes (tumor promoter genes) can promote cell proliferation and tumor growth.

- **Tumor Suppressor Genes**: Conversely, the inactivation of tumor suppressor genes, which normally inhibit cell growth or promote cell death, can contribute to unchecked cell division and tumor formation.[3]

   Risk factors include family history, genes and chromosomes, age, environmental factors, geography, diet, infection, medication and medical treatment, and inflammatory disorder. Diagnosis includes imaging tests like CT, MRI, nuclear medicine scan, X-ray, ultrasound, bone scan, PET scan, and biopsy. Tobacco use contributes to 22% of cancer deaths. Alcohol consumption can increase the risk of at least six types of cancer including bowel, mouth, pharynx, and larynx.[4]

Treatment of cancer includes chemotherapy, hormone therapy, hyperthermia, immunotherapy, photodynamic therapy, radiation therapy, surgical ablation, and targeted therapy. The most recommended conventional cancer treatment strategies include surgical resection of the tumours followed by radiotherapy with X-ray and /or chemotherapy. Advanced and innovative cancer therapies include stem cell therapy, pluripotent stem cells, adult stem cells, cancer stem cells, and targeted drug therapy. Targeted drug therapy includes monoclonal antibodies, ablations cancer therapy, small molecule inhibitors, thermal ablation, gene therapy, and natural antioxidants.[5]

OBJECTIVE

- To find out the proportion of different cancers in different age populations.

MATERIALS AND METHODS:

A Retrospective observational study was carried out in the oncology department of St. Gregorios Medical Mission Multi-Specialty Hospital, Parumala, Thiruvalla. A sample size of 400 patients was selected. The study duration was 6 months. The study was conducted after receiving approval from the Institutional Ethics Committee of Pushpagiri Medical College Hospital, Thiruvalla. The data collection form includes the demographic criteria, reports, complaints,staging, recurrence, treatment, and follow-up. The study conducted was to find out different types of cancer in different age groups, and gender-wise distribution, to find the occurrence of breast and lung cancer. Inclusion criteria included patients of all age groups, patients with co-morbidities, and patients who underwent chemotherapy. Exclusion criteria include In-patients and direct patient interviewing. Data was statistically analysed in Microsoft Excel 2019 and results were analysed in tabular form and percentage.

RESULT

1: DISTRIBUTION OF CANCER IN AGE GROUPS

Sl. No.	Age group	Frequency	Percentage (%)
1	21-30	3	0.75
2	31-40	21	5.25
3	41-50	50	12.50
4	51-60	78	19.50
5	61-70	118	29.50
6	71-80	87	21.75
7	81-90	40	10.00
8	91-100	3	0.75
	Total	400	100

Table no.1: Distribution of cancer in age groups

The study enrolled 400 participants comprising about 29.5% of participants who belonged to the age group of 61-70, 21.75% of participants who belonged to the age group of 71-80, 19.50% of participants who belonged to the age group of 51-60, 12.50% of participants who belonged to the age group of 41-50, 10%of participants who belonged to the age group of 81-90, 5.25% of participants who belonged to the age group of 31-40, 0.75% of participants who belonged to the age group 21-30 and 0.75% of participants belonged to the age group 91-100.

1.1. DISTRIBUTION OF CANCER IN AGE GROUP 21-30
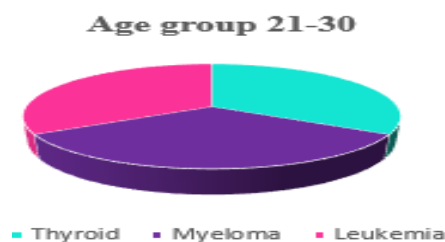

Age group 21-30

Thyroid ● Myeloma ● Leukemia

Figure No.1.1: Age group 21-30

The study analyzed that in the age group of 21-30 among the 400 population, it was foundthat 33.33% had Thyroid cancer, 33.33% had Myeloma and 33.33% had Leukemia.

1.2. DISTRIBUTION OF CANCER IN AGE GROUP 31-40

Type of cancer	Age group (31-40)	Percentage (%)
Thyroid	9	42.81
Leukemia	2	9.52
Colon	2	9.52
Endometrium	2	9.52
Lymphoma	2	9.52
Ovary	1	4.76
Testes	1	4.76
Skin	1	4.76
Prostate	1	4.76

Table no.1.2: Distribution of cancer in age group 31-40

The study analyzed that in the age group of 31-40 among the 400 population, it was foundthat 42.81% had Thyroid cancer, 9.52% had leukemia, 9.52% had colon cancer, 9.52% had endometrial cancer, 9.52% Lymphoma, 4.76% had Ovarian cancer, 4.76% had Testes cancer, 4.76% had skin cancer and 4.76% had prostate cancer.

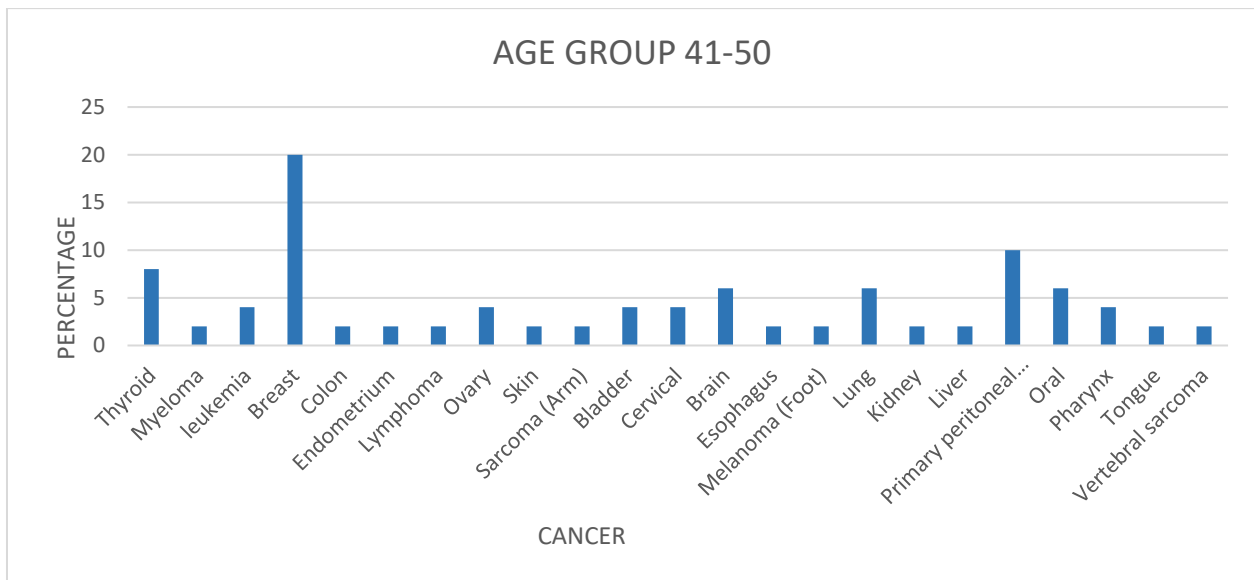## 1.3. DISTRIBUTION OF CANCER IN AGE GROUP 41-50

Figure No.1.3: Age group 41-50

The study analyzed that in the age group of 41-50 among the 400 population, it was foundthat 20% had breast cancer, 10% had Primary peritoneal carcinoma, 8% had thyroid cancer, 6% had lung, brain, and oral cancers each, 4% had leukemia, ovary, bladder, cervical and pharyngeal cancers each and 2% had myeloma, lymphoma, arm sarcoma, foot melanoma, vertebral sarcoma and cancer in colon, endometrium, skin, kidney, esophagus, liver and tongue

1.4. DISTRIBUTION OF CANCER IN AGE GROUP 51-60

Cancer	Age group (51-60)	Percentage (%)
Thyroid	4	5.13
Myeloma	2	2.56
Breast	24	30.7
Colon	4	5.13
Endometrium	1	1.28
Lymphoma	3	3.85
Ovary	3	3.85
Skin	3	3.85
Prostate	2	2.56
Cervical	3	3.85
Brain	2	2.56
Esophagus	2	2.56
Lung	5	6.41
Kidney	2	2.56
Liver	2	2.56
Primary peritoneal carcinoma(omentum)	5	6.41
Oral	4	5.13
Rectum	2	2.56
Tongue	2	2.56
Larynx	1	1.28
Osteosarcoma (Pelvis)	1	1.28
Tonsil	1	1.28

Table no.1.4: Distribution of cancer in age group 51-60

The study analyzed that in the age group of 51-60 among the 400 population, it was foundthat 30.7% had breast cancer, 6.41% had cancer in the colon, lung, and Primary peritoneal carcinoma each, 5.13% had lymphoma and cancer in the thyroid, skin, oral each, 3.85% had cancer in ovary, cervix, and tongue each, 2.56% had myeloma, osteosarcoma, and cancer in prostate, brain, kidney, liver, and rectum.

1.5. DISTRIBUTION OF CANCER IN AGE GROUP 61-70

Cancer	Age group (61-70)	Percentage (%)
Thyroid	2	1.69
Myeloma	1	0.84
Breast	29	24.57
Colon	7	5.93
Endometrium	1	0.84
Lymphoma	3	2.54
Skin	2	1.69
Prostate	7	5.93
Sarcoma (Arm)	1	0.84

Bladder	4	3.38
Cervical	3	2.54
Brain	1	0.84
Esophagus	5	4.23
Melanoma (Foot)	3	2.54
Lung	8	6.77
Kidney	1	0.84
Liver	2	1.69
Primary peritoneal carcinoma	4	3.38
Oral	2	1.69
Tongue	2	1.69
Vertebral sarcoma	1	0.84
Rectum	11	9.32
Larynx	2	1.69
Osteosarcoma	1	0.84
Angiosarcoma	1	0.84
Tonsil	2	1.69
Nasopharynx	1	0.84
Penis	2	1.69
Vulva	2	1.69
Duodenum	2	1.69
Spinal sarcoma	2	1.69
Uterus	3	2.54

Table no.1.5: Distribution of cancer in age group 61-70

The study analyzed that in the age group of 61-70 among the 400 population, it was foundthat 24.57% had breast cancer, 9.32% had rectal cancer, 6.77 % had lung cancer, 5.93% had cancer in the colon and prostate each, 4.23% had cancer in the esophagus, 3.38% had cancer in the bladder and Primary peritoneal carcinoma, 2.54 % had foot melanoma, lymphoma, cervical carcinoma and cancer in the uterus, 1.69% had thyroid, liver, oral, tongue, larynx, tonsil, penis and skin cancer each, 0.84% had vertebral sarcoma, arm sarcoma, spinal sarcoma, angiosarcoma, osteosarcoma, myeloma and cancer in endometrium, brain, kidney, duodenum, vulva, and nasopharynx

1.6. DISTRIBUTION OF CANCER IN AGE GROUP 71-80

Cancer	Age group (71-80)	Percentage (%)
Breast	17	19.54
Colon	3	3.44
Endometrium	1	1.15
Lymphoma	7	8.04
Ovary	2	2.29
Testes	1	1.15
Skin	5	5.74
Prostate	14	16.09

Bladder	4	4.59
Esophagus	2	2.29
Melanoma (Foot)	1	1.15
Lung	8	9.19
Primary peritoneal carcinoma	7	8.04
Oral	2	2.29
Pharynx	2	2.29
Tongue	2	2.29
Rectum	3	3.44
Ear squamous cell carcinoma	1	1.15
Buccal	1	1.15
Larynx	1	1.15
Osteosarcoma	1	1.15
Angiosarcoma	1	1.15
Tonsil	1	1.15

Table no.1.6: Distribution of cancer in age group 71-80

The study analyzed that in the age group of 71-80 among the 400 population, it was found that 19.54% had breast cancer, 16.09% had prostate cancer, 9.19% had lung cancer, 8.04% had lymphoma and Primary peritoneal carcinoma each, 5.74% had skin cancer, 4.59% had bladder cancer, 3.44% had cancer in colon and rectum each, 2.29% had ovary, pharynx, esophagus, and oral cancer each, 1.15% had angiosarcoma, foot melanoma, ear squamous cell carcinoma, osteosarcoma and cancer in endometrium, testes, tongue, buccal and larynx

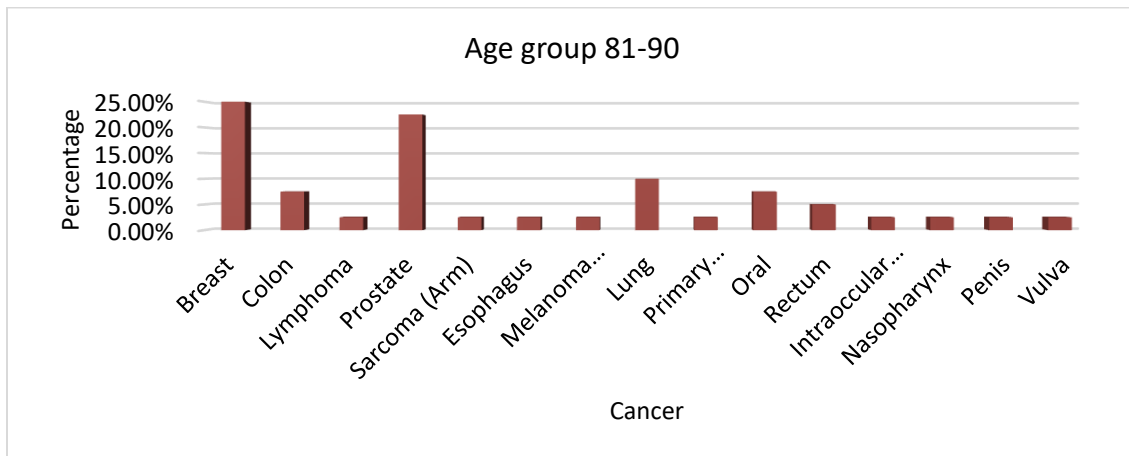## 1.7. DISTRIBUTION OF CANCER IN AGE GROUP 81-90

Figure No.1.7: Age group 81-90

The study analyzed that in the age group of 81-90 among the 400 population, it was found that 25% had breast cancer, 22.5% had prostate cancer, 10% had lung cancer, 7.5% had oral and colon cancer, 5% had rectal cancer, 2.5% had lymphoma, primary peritoneal carcinoma, arm sarcoma, foot melanoma, intraocular lymphoma and cancer in the esophagus, nasopharynx, penis, and vulva.

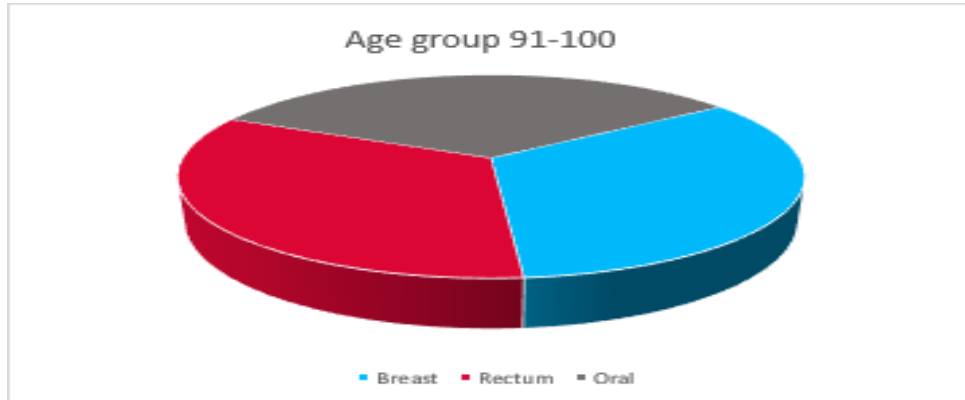## 1.7. DISTRIBUTION OF CANCER IN AGE GROUP 91-100

Figure No.1.8: Age group 91-100

The study analyzed that in the age group of 91-100 among the 400 population, it was foundthat 33.33% had Breast cancer, 33.33% had Rectal cancer and 33.33% had Oral cancer.

DISCUSSION

Cancer indeed refers to a group of diseases characterized by the uncontrolled growth and spread of abnormal cells. Cancer can begin in almost any organ or tissue of the body. It originates when normal cells undergo genetic mutations that allow them to grow uncontrollably. The ability of cancer cells to spread to other parts of the body is called metastasis. This is a significant factor in the severity of cancer and its treatment.

Among the 400 participants enrolled in the study, the occurrence of cancer was found to be greater in the population of age group ranging from 61-70 (29.50%) followed by 71-80(21.75%),51-60(19.50%),41-50(12.50%),81-90(10%),31-40(5.25%),21-30(0.75%),91-100(0.75%). The study done by **Binu V.S** et al also stated that out of the total 957 cases, the median age of male and female patients were 63 & 60 years, respectively [6]

Following the distribution of different cancer in age groups, in the age groups ranging from 21-30, it was found that 33.3% among the 400 participants had thyroid cancer, myeloma, and leukemia. The study analyzed that in the age group of 31-40 among the 400 population, it was foundthat Thyroid cancer had the greatest occurrence with a percentage of 42.81%, and Ovarian, Testes, skin, and prostate cancers had the least occurrence with 4.76%. In age groups ranging from 41-50, the study analyzes that 20% had breast cancer which was the highest, and 6% had lung, brain, and oral cancers each of which was the least. The study analyzed that in the age group of 51-60 among the 400 population, it was found that the highest occurrence was of breast cancer with a percentage of 30.7% and the lowest population was for myeloma, osteosarcoma, cancer in prostate, brain, kidney, liver, and rectum with a percentage of 2.56%. The study analyzed that in the age group of 61-70 among the 400 population, it was found that 24.57% had breast cancer which was the highest and 0.84% had vertebral sarcoma, arm sarcoma, spinal sarcoma, angiosarcoma, osteosarcoma, myeloma and cancer in endometrium, brain, kidney, duodenum, vulva, and nasopharynx which was the lowest.

The study analyzed that in the age group of 71-80 among the 400 population, it was foundthat the highest occurrence was for breast cancer with a percentage of 19.54% and the least occurrence was for angiosarcoma, foot melanoma, ear squamous cell carcinoma, osteosarcoma and cancer in endometrium, testes, tongue, buccal and larynx with a percentage of 1.15%.In age groups ranging from 81-90, it was

found that 25% had breast cancer which is the highest, and 2.5% had lymphoma, foot melanoma, Primary peritoneal carcinoma, intraocular lymphoma, and cancer in the esophagus, nasopharynx, penis, and vulva which was the lowest. Inage groups ranging from 91-100, it was found that 33.33% had breast, rectal, and oral cancer each.

CONCLUSION

The study revealed significant patterns in cancer occurrences across different age groups and genders:

- Age Group with Highest Incidence: The age group 61-70 had the highest overall number of cancer cases.
- Gender Differences: Females had a higher incidence of cancer compared to males, accounting for 56% of cases versus 44%.
- Cancer Types by Age Group:

Ages 21-30: The most common cancers were thyroid, osteosarcoma, and Leukemia, each contributing to 33.33% of cases.

Ages 31-40: Thyroid cancer was notably prevalent, representing 42.81% of cases.

Ages 41-50: Breast cancer was the leading type, constituting 20% of cases.

Ages 51-60: Breast cancer remained the most common, with 30.7% of cases.

Ages 61-70: Breast cancer continued to be the most frequent type, making up 24.57% of cases.

Ages 71-80: Breast cancer was again the most prevalent, accounting for 19.54% of cases.

Ages 81-90: The prevalence of breast cancer was 25% in this age group.

Ages 91-100: This group had a mix of breast, rectal, and oral cancers, with each type comprising 33.33% of cases.

These findings indicate a strong prevalence of breast cancer across multiple age groups, especially as individuals grow older.

LIST OF ABBREVIATIONS

MRI: Magnetic resonance imaging, CT: Computed tomography

CONFLICT OF INTEREST:

The authors declared that there is no conflict of interest.

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