A RETROSPECTIVE COMPARATIVE STUDY AND EVALUATION OF TUMOR BURDEN IN CONVENTIONAL VERSUS TRADITIONAL ANTI-NEOPLASTIC DRUGS

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ABSTRACT

Background information: Cancer is a disease distinguished by uncontrollable or abnormal growth of cells resulting in the formation of malignant or benign tumors and suppressing the immune system, thereby deteriorating the quality of life of the host. The most common cause of mortality worldwide is "Cancer", with an incidence of about 10 million deaths every year. India estimates about 14 61,427 cases roughly 100.4 per 100,000. With the increasing number of cancer cases, there is an advancement in its treatment as well. As the advancement in the treatment is seen, we also witness the serious side effects and ADRs connected with them, which are sometimes fatal to the patient. Therefore, it is necessary to have a rough idea about which drugs, either the traditional or the conventional, pose lesser side effects and are better choices for treating Cancer and improving a patient's quality of life. **Aim:** This study aims to compare the effectiveness of two drug classes for treating different types of cancer while assessing the tumor burden. The goal is to gain in-depth knowledge of the diseases and provide patients with effective treatment options. **Objective:** In this investigation, the patient with cancer will be extensively examined. To learn in-depth about the relevant illness and their condition. Demonstrating the patient's examination reports and the parameters with which we are going to assist the information already stored in the record room is going to be used in the thesis The treatment of cancer and the use of anti-neoplastic drugs should be evaluated. **Method:** A retrospective observational study evaluated the drugs to treat carcinoma in the Oncology department. Study period: The study was carried out for 6 months in Care hospital. **Study population:** The sample size consisted of 60-100 patients who qualified for the inclusion criteria for the study. **Results:** According to the study we analyzed 60 cases of Cancer patients out of which 34 cases were male and 26 were female between the age group of 9-80 years and the Cancer incidence rate in females was higher than in the male population. Some of them received the T drugs and few received C drugs, while the treatment cycle. Varied from 4-18. After a thorough investigation we found that both types of drugs were employed to treat Cancer and both of them were effective but the T drugs have much superior outcomes than the C drugs. Most Oncologists still prescribe the T drugs as before because of their fewer side effects, cost potency, and affordability by the patients. **Conclusion:** From the study, we can conclude that the prescribing pattern of the physicians still includes Traditional drugs such as Paclitaxel, Rituximab, Cisplatin, Carboplatin, 5FU, Zolendronic acid, and sometimes alongside other drugs. We found that traditional drugs had fewer side effects and were affordable to the patients. Conventional drugs were also used but not as often as the T drugs. In the coming years, we might see the increasing use of C drugs if they show lesser side effects with cost affordability. Another finding in the study that we came across was the patients with the blood group A+ were prone to Cancer in the 6 months, although this doesn't prove that the patients who belong to this blood group acquire Cancer commonly than the other blood group.

I. INTRODUCTION

1.1 What is cancer?[1]

Well, the uncontrolled cell division is the cause of cancer. When cells undergo mutational changes in the normal functioning of the host's body such a condition is called Cancer.

Eventually, certain cancers may spread or metastasize to other tissues and can be called Malignant. To make it convenient cancer has been categorized into main distinct categories.

There are 2 main categories of cancer

i. **Hematologic or blood cancers:** Cancers of the blood cells which include leukemia, lymphoma myeloproliferative disorder, multiple myeloma, etc.

ii. **Solid tumor cancers:** Cancers of other organs or tissue in the body other than blood are known as solid tumor cancers. Some of the most prevalent

solid tumors are colorectal, lung, prostate, breast, colon, lymphoma and other respective malignancies.
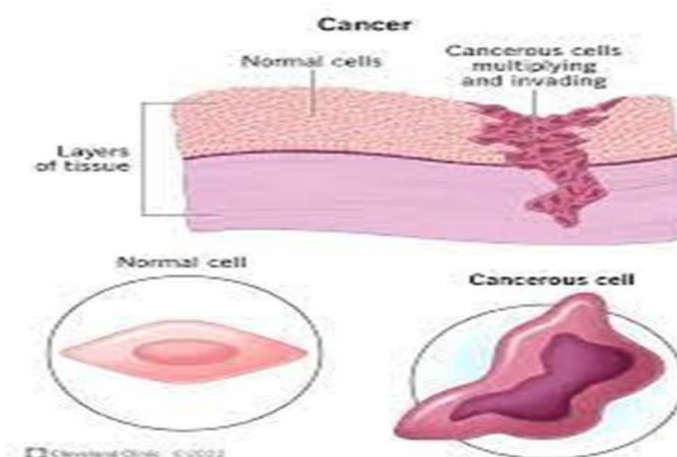
- **Difference between Benign and Malignant tumors**
i.   Benign
Benign tumors typically grow slowly, refrain from spreading to other regions of the body, and are not invasive to the tissues surrounding them.

Growth of cancer cells

Note: Carcinomas are not benign tumors.

ii.   Malignant
Malignant tumors have an uncontrollably rapid growth rate. These tumors have the potential to grow and spread locally. These tumors' cells can split off, move through the lymphatic or circulatory systems, and begin sprouting in different areas of the body. This process is known as metastasis.

The location of a malignant tumor often affects the symptoms that are Experienced. Radiation therapy, chemotherapy, and surgeries are methods Employed to treat malignant tumors.

1.2   Characteristics of malignant tumors[4]
i.   They usually grow quicker than that of benign tumors.
ii. Spread into surrounding tissues and cause damage.
May spread to distinct parts of the body via the bloodstream or through the lymph system.

1.2.1   Staging of cancer[1,4]
Cancer staging: A cancer's size and extent of growth are described by its staging. When a cancer is initially diagnosed, tests are performed to determine the cancer's size, if it has spread to nearby tissues, and whether it has spread to other body areas.

System types: There are 2 main systems for cancer staging.

Additionally, until their size grows large enough to press against other structures, they rarely produce symptoms. Radiation and medication can also be employed, but surgery is usually the course of therapy if patients necessitate it.

1.1.1   Characteristics of benign tumors
i.   Usually grow quite slowly
ii.   Don't spread to distinct parts of the body
iii. Usually have a covering made up of normal cells.

They are the Number system and the TNM system
i.   When describing the extent and size of malignancies, doctors speak in unison.
ii.   Medical professionals can compare therapy outcomes from various trials.
iii. Standard treatment protocols vary throughout clinics and hospitals. Specific staging methods
iv.   Exit for several blood and lymphatic system malignancies.

1.3   The tnm staging system
Tumor, Node, Metastasis is the acronym for the TNM staging system.
- T indicates the tumor's size
- N indicates whether the lymph nodes possess Cancer cells.
- M indicates if the cancer cells have migrated to another area of the body.

Approaches to cancer treatment[7]
- **Chemotherapy**
A treatment using anti-cancer drugs is chemotherapy. Learn about the probable symptoms, when you might have it, and how to treat it.

- **Cancer drugs**
➢ Learn about the various cancer medications, their combinations, potential side Effects and Coping mechanisms

- **Surgery for cancer**
- ➤ One of the key treatments for many cancer kinds is surgery. Learn about the possible causes, when it may occur, and what to anticipate both before and after the procedure.

- **Radiotherapy**
- ➤ Learn about, the radiation therapy given for cancer comprising, external and internal radiation, side effects, radiation for symptoms, and post-treatment monitoring.

- **Hormone therapy**
- ➤ Learn about radiation therapy for cancer, including external and internal radiation, side effects, radiation for symptoms, and post-treatment monitoring.

- **Stem Cell and Bone marrow transplantation**
- ➤ Bone marrow transplants and stem cell therapy are used to treat leukemia, lymphoma, and multiple myeloma. You employ radiation therapy and/or high-dosage chemotherapy.

- **Targeted cancer drugs**
- ➤ 'Targeting' the variations that allow a cancer cell to proliferate and survive is how targeted cancer medication functions.

- **Immunotherapy**
- ➤ Through immunotherapy, cancer is combated by our immune system. It's being researched for several cancer types and is a standard treatment option for some others.

- **Bisphosphonates**
- ➤ Drugs called bisphosphonates may be delivered to cure or prevent bone loss and lower the likelihood of fracture. Bisphosphonates come in a variety of forms, and they all function quite differently.

Antineoplastic agents
1. Drugs called antineoplastics are used to treat cancer.
2. Antineoplastic medications are often known as cytotoxic, anticancer, chemotherapy, chemo, or hazardous medications.
3. These medications are available as liquids or pills among other forms.

Among the substances that are antineoplastic agents are as follows
Antifolates, Purine Analogues, Methotrexate, Pemetrexed, Pralatrexate Trimetrexate, Azathioprine, Cladribine.

Classifying the antineoplastic agents is challenging work
In historical context, they are classified as
1. Alkylating agents
2. Antimetabolites
3. Natural products
4. Hormones and antagonist
5. Miscellaneous.

However, several most significant agents are now a portion of the miscellaneous category.
Aside from indications (Lymphoma, leukemia, melanoma, solid tumors), anticancer agents can also be categorized by the structure of the compound (Folic acid analog, platinum coordination complex, purine or pyrimidine analog, monoclonal antibody), mechanism of action (Alkylating agents, antibiotics, biological response modifiers, antiandrogens, or protein kinase inhibitors), or by the distinction between cytotoxic or nonspecific and noncytotoxic or targeted.

Traditional chemotherapy Drugs in use	Conventional chemotherapy Drugs in use
Paclitaxel	Nab paclitaxel
Carboplatin	Cisplatin
Oxaliplatin	Doxorubicin
Transtuzumab	Atezolizumab
5 flurouracil	Leucovorin
Gemcitabine	Capecitabine
Etophosphamide	Cyclophosphamide
Adriamycin	Bleomycin
Etoposide	Rituximab

II. METHODOLOGY

Study design	Retrospective comparative study.
Sample size	60
Study site	Care Hospital
Study duration	6 months
Study criteria	To evaluate the use of Anti-neoplastic drugs in cancer treatment.

2.1 Study procedure
This is a retrospective observational study where patient data is collected analyzed and used accordingly as needed in the thesis. The data collection form was

prepared and evaluated. This form mainly contains the demographic details of the patient and the medication chart.

The study was conducted at care hospital. All information relevant to the study will be collected in the inpatient outpatient and MRD departments.

2.1.1 MATERIALS AND METHODS
2.1.1.1 Study design
An Observational retrospective study to evaluate the drug prescription in the carcinoma disease oncology department.

2.1.1.2 Study period
The study was carried out for 6 months.

2.1.1.3 Study population
The study population consists of 60 patients who qualify for the required inclusion criteria.

2.1.2 Source of Data and Materials
- Patient Proforma.
- Patient data collection form- Necessary information is gathered with their consent.
- Medical record department- previous cases of Cancer or recurrent cases of cancer are to be collected from the MRD.
- Patient case note/prescription- The prescribed Pre-Chemotherapy, Chemotherapy medication, and the

crucial information required for the study will be collected manually.

2.1.3 Inclusion criteria
The study involved the following subjects
- All the patients of either gender attending the Oncology department.
- Patients between the age groups of 8 – 80 years.
- Patients afflicted with Cancer.

2.1.4 Exclusion criteria
- The subjects who were not included in the study are
- Patients with Psychiatric Disorders.
- Pregnant and lactating women are excluded

2.1.5 Method of data collection
- Relevant data required for the evaluation will be collected with the consent of the patients.
- Previous information on Cancer patients whether cured or still under treatment Will be collected from the Medical Records Department.

III. RESULTS AND DISCUSSION
A study was performed in Hyderabad in Telangana state for 6 months to assess the Knowledge of both classes of drugs (Antineoplastic) used in the thesis a retrospective comparative study and evaluation of tumor burden in conventional versus traditional anti-neoplastic drugs.

3.1 Demographic details
Table 4.1.1: Bar graph representing the distribution of age of the participants.
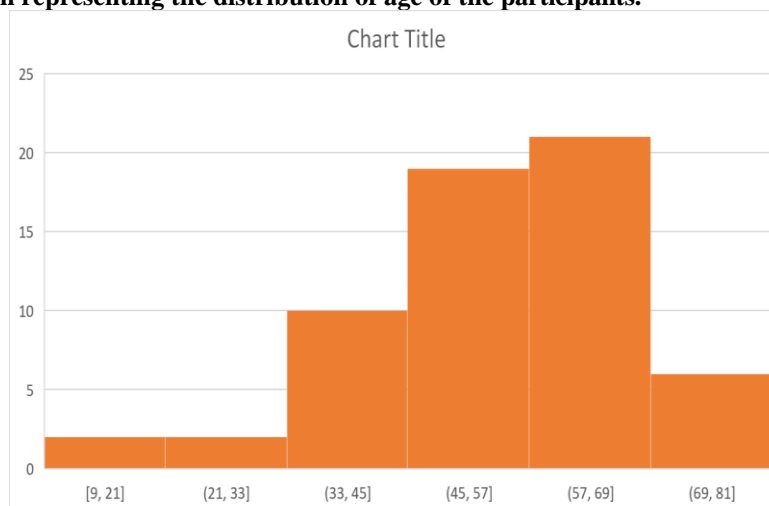
According to the bar graph, we can conclude that patients aged from 57years to 69 years have a higher chance of getting cancer 21 patients from the sample size are from the age range of 57 to 69.

Table 5.1.1: Table representing the distribution of age of the participants.
The following table describes the ages that are included in the thesis and the higher altered risk of cancer

Ages	No of cases
Age 9-21	02
Age 21-33	02
Age 33-45	10

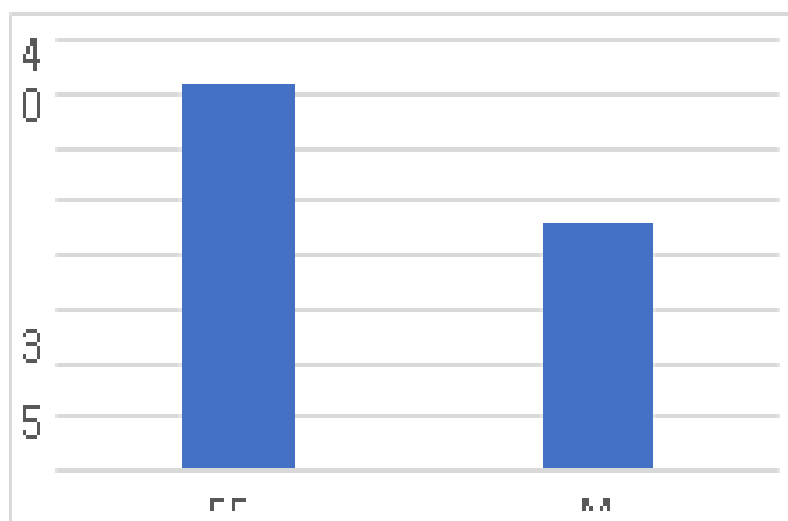| Age 45-57	19
Age 57-69	21
Age 69-81	6

Gender ratio

Figure 5.1.2: Bar graph representing the distribution of gender of the participants.

From this study, we have observed that the number of females taking part in our study was more than that of males Females have a greater no of the population in the sample size 36 cases of females are present in the sample size

Table 5.1.3: Table representing the distribution of gender of the participants.

Gender	No of cases
Male	24 cases
Female	36 cases

From the following

Tabular data we can conclude that the female population has a higher chance of suffering from cancer as more than 50% of the population from the sample size is female.

Blood group
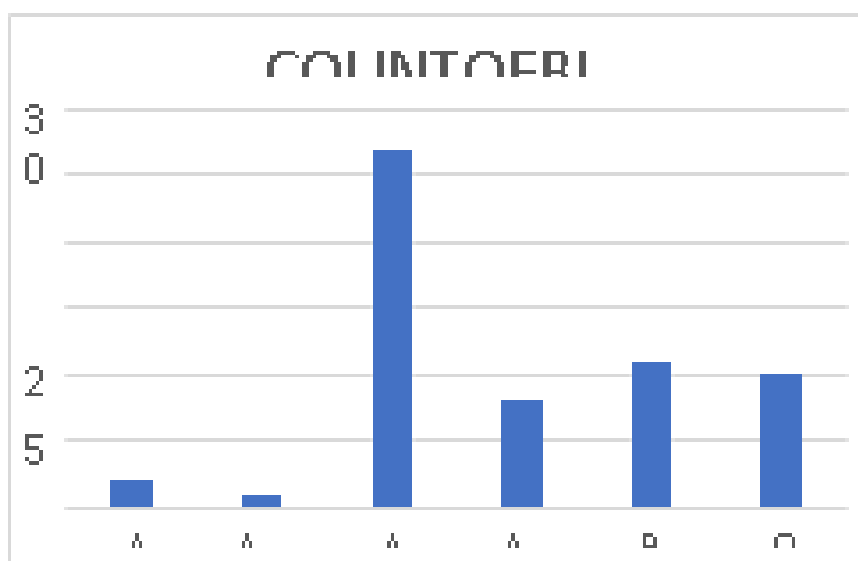
Figure 5.1.4: Bar graph showing the distribution of blood groups in the population.

Figure 5.1.5 Bar graph showing the distribution of blood groups in the population.

Blood group	No of cases
A+	27
B+	12
AB+	6
O+	10
ARH+	2
A-	3
TOTAL	60

The following graphical and tabular representation data show us the different types of blood groups from the population It states that the A+ group has a higher chance of suffering from cancer and it is mostly common in the population There are 27 A+ cases in the population provided.

The next common is B+ 12 cases in the population.

Severity count
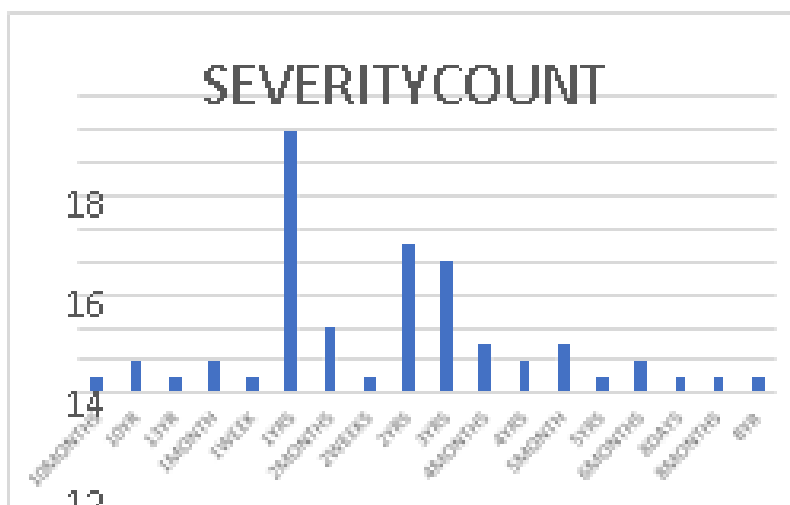
Figure 5.1.6: Bar graph showing the distribution of severity of the disease.

Gives us information about the severity of the disease and how long the pt is suffering from the condition most cancer can occur in the early-stage age of 25 – 30 and can get cured or last for a long time.

In the following population, the most patient severity is from last 1year and there are 2 pt who have been suffering for a long time i.e. 5yr.

WBC Count before medication
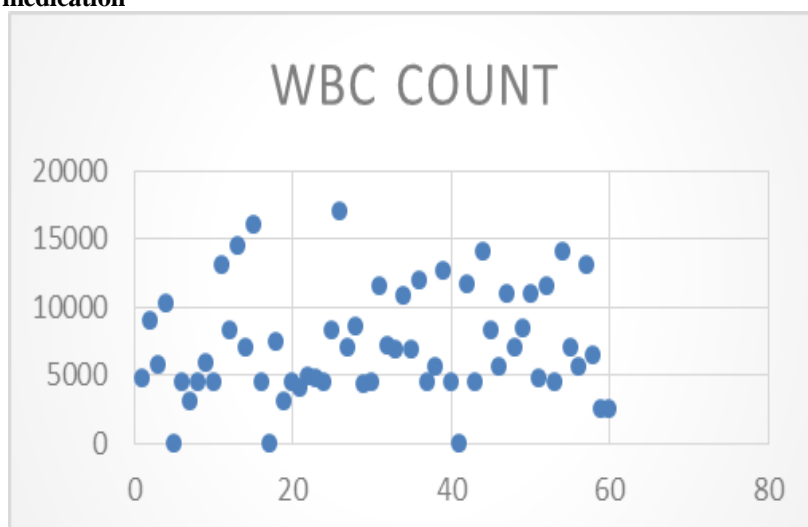
Figure 5.1.7: Bar graph showing the distribution of WBC after medication.

The WBC level is much lesser than the level after mediation the higher frequency has reached a limit of mostly 17000 microliters there is an average increase in WBC in cancer.
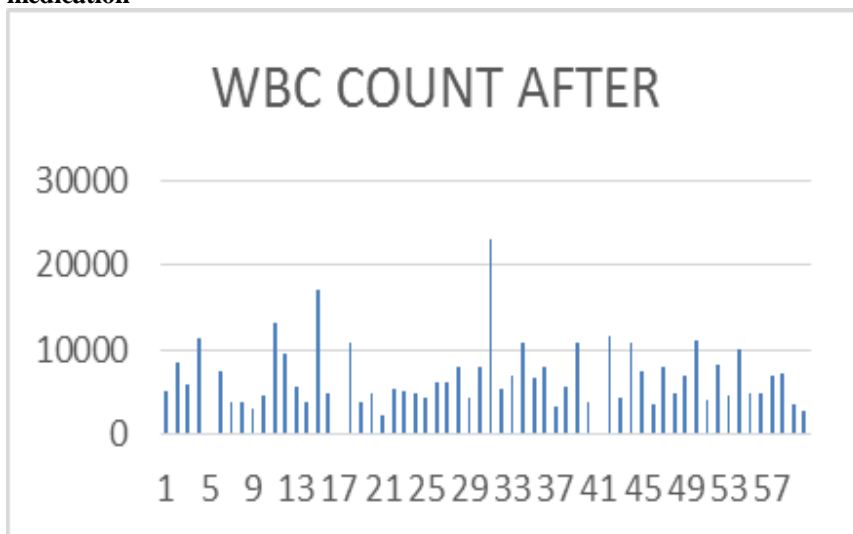
WBC Count after medication

Figure 5.1.7: Bar graph showing the distribution of WBC after medication.

In most cases, there is a rise in WBC count after consumption of medication as normally there is 17000 microliters before medication but after mediation, it leads to 22000 microliters which is double in number before medication.
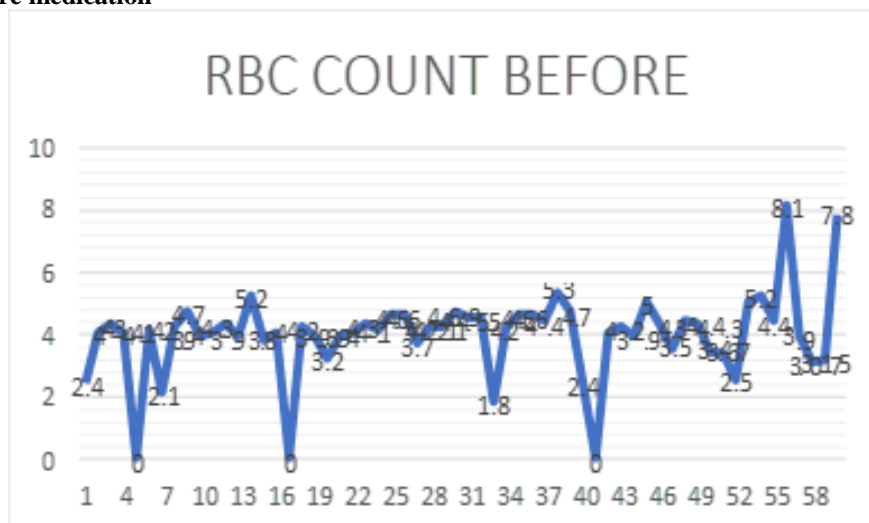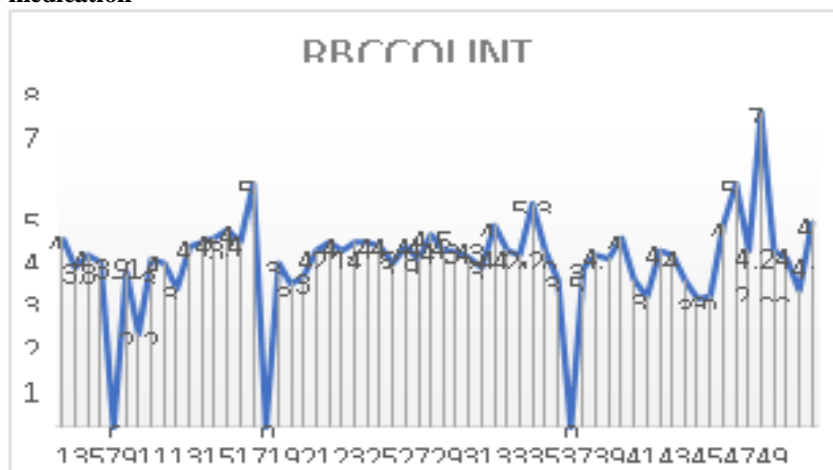
RBC Count before medication

Figure 5.1.8: Bar graph showing the distribution of RBC before medication.

NORMAL RANGE OF RBC MALE = 4.7 – 6.1 MILL (cell/mall)
FEMALE = 4.2 – 5.4 MILL (cell/mill)

High RBC levels are probable in cancer might be due to the presence of tumor cells in the body which can be as high as 8.1 mill (cell/MCL.

RBC Count before medication

Figure 5.1.9: Bar graph showing the distribution of RBC after medication.

There is a lower probability of high RBC level after the use of medication in cancer compared to before the use of medication the highest point after medication is 7.5mill(cells/ml)

ECG

Figure 5.1.10: Bar graph showing the distribution of ECG reports.

According to the research majority of the pt have a normal sinus rhythm only a few of them pt have an abnormal sinus (12 pt)

Chemotherapy after medication
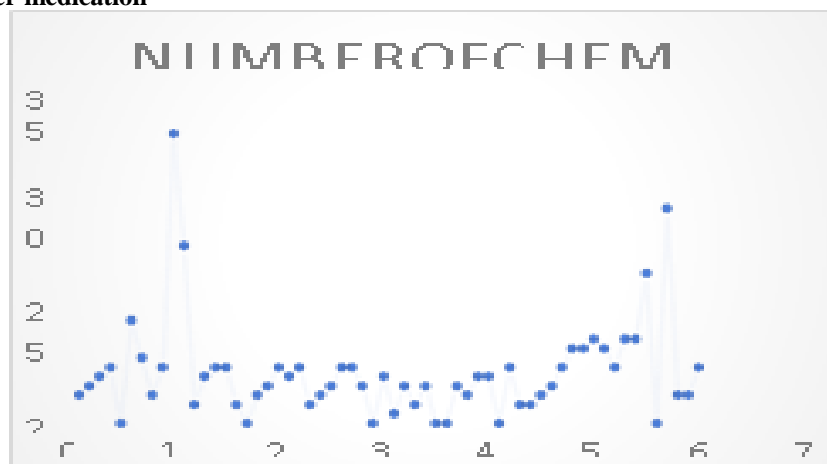
Figure 5.1.11: Bar graph showing the distribution of the number of chemo cycles before medication.

When a pt is diagnosed with cancer the priority of treatment is opted for chemotherapy which helps in reducing the tumor size easily in a rapid way

Usually, there are 4 – 8 cycles of chemotherapy each cycle lasts up to 3 weeks

Before the use of medication pt needs chemotherapy on a large basis in the given population a pt has received 31 cycles and another pt has received 21 cycles.
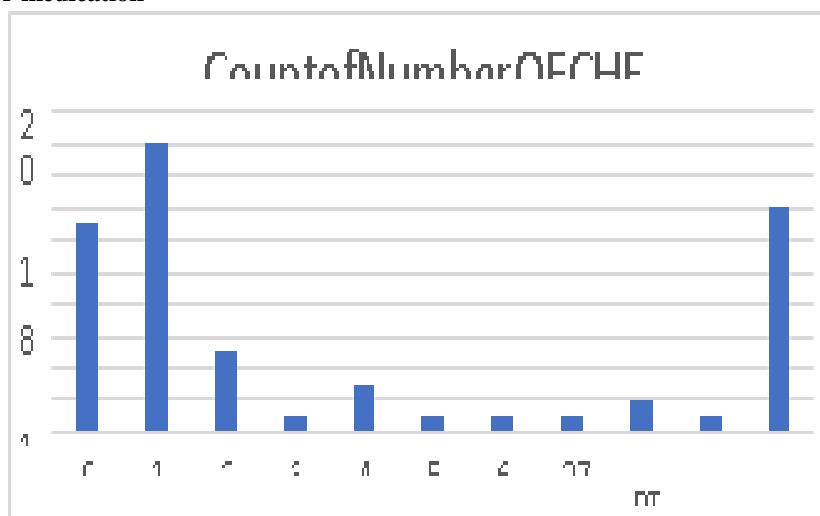
Chemotherapy after medication

Figure 5.1.12: Bar graph showing the distribution of the number of chemo cycles after medication.

After the mediation has been received the pt may continue the chemotherapy but it might reduce in the number of cycles than before the medication.

The greatest number of cycles received by pt after medication is 18 cycles much lesser than before mediation.
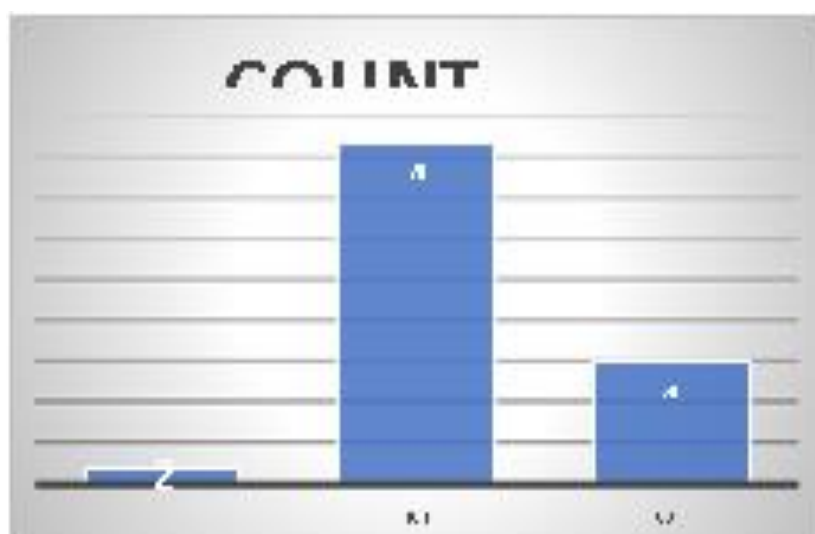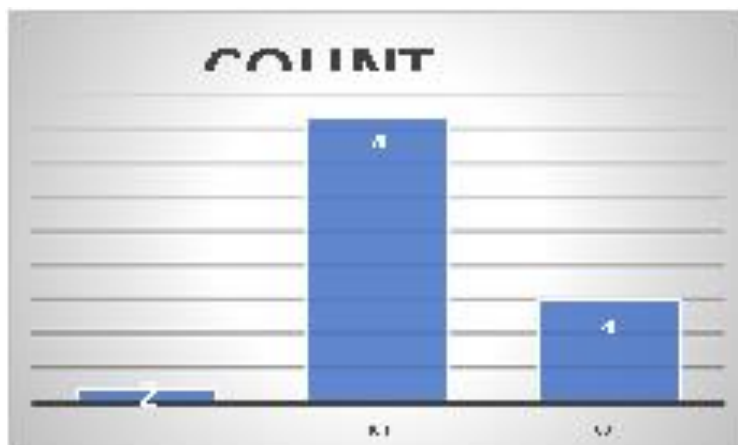
Recurrent

Figure 4.1.12: Bar graph showing the distribution of recurrent in patients.

Recurrent may have a probability of 50/50 chances

Recurrent refers to the reoccurring of the disease even after getting cured

The pt can suffer the disease even after the surgery or may have an impact of it later on in his life According to the research recurrent may not happen always in the population of 60 recurrent has affected only 16 patients as shown in the bar graph it might happen in few cases.

Recurrent

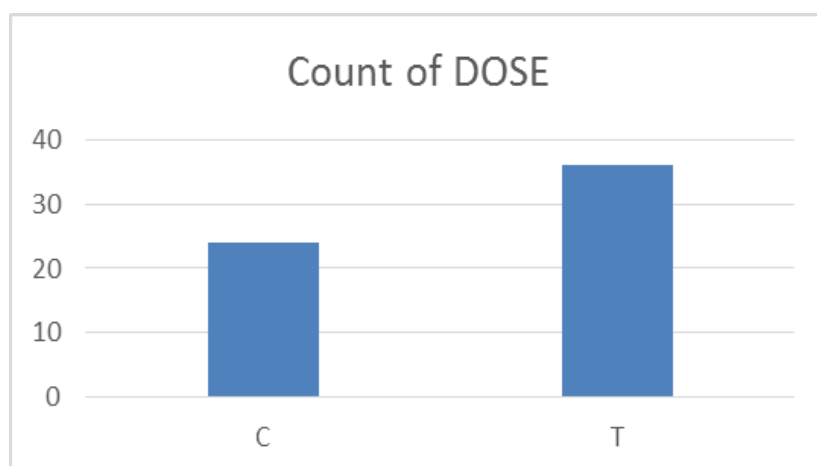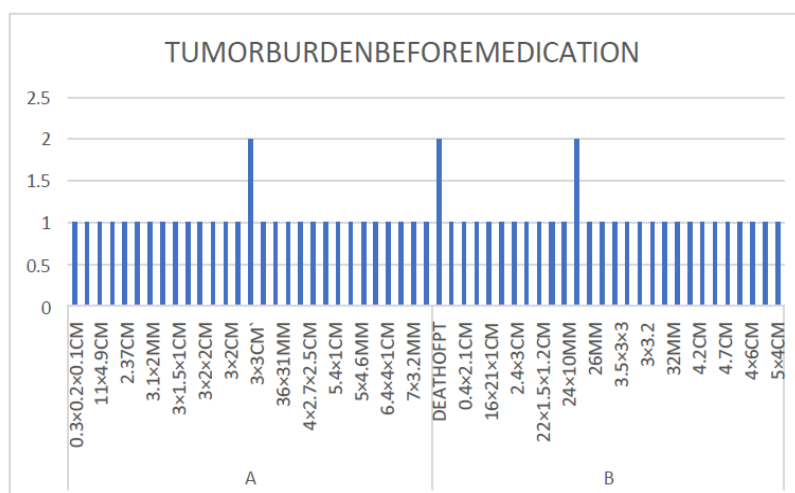**Figure 5.1.13 Bar graph showing the distribution of recurrent in patients.**

Recurrent may have a probability of 50/50 chances Recurrent refers to the reoccurring of the disease even after getting cured The pt can suffer the disease even after the surgery or may have an impact of it later on in his life According to the research recurrent may not happen always in the population of 60 recurrent has affected only 16 patients as shown in the bar graph it might happen in few cases.
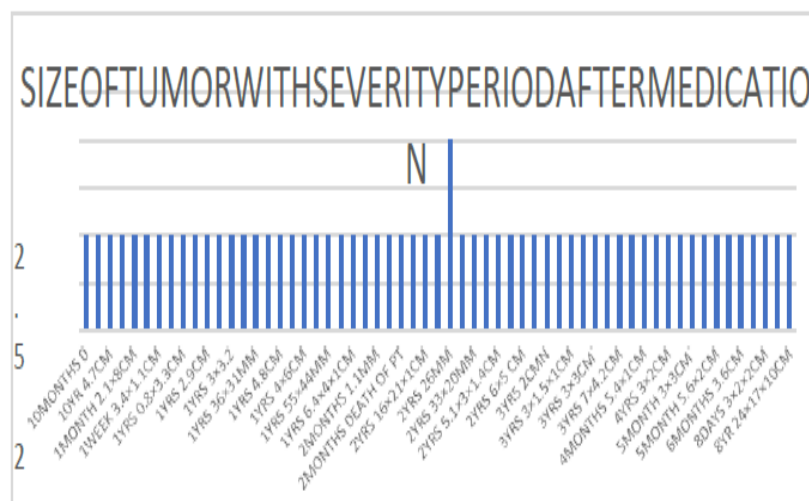
Dosing

Figure 5.1.14: Bar graph showing the distribution of dosing in patients.

Tumor burden

Figure 5.1.15: Bar graph showing the distribution of Tumor burden in patients.

Tumor burden refers to the amount or size of cancerous growth in a particular body area. It occurs when there is an abnormal increase in the number of cancerous cells in a specific location. The tumor size can vary from person to person, but on average, it is around 3-4cm. If left untreated, the tumor can grow larger and spread to other body parts. However, consuming medication can help in degrading the size of the tumor and reducing its negative impact on the body.

Figure 5.1.16: Bar graph showing the distribution of Tumor burden after using medication in patients.

The data indicates that the majority of patients have chosen to undergo surgical intervention as a means of treating their condition, resulting in a significant reduction in tumor size of approximately 1cm. This approach appears to have been effective in achieving the desired outcome. Furthermore, the data provides evidence in support of the efficacy of medicinal interventions in achieving positive results. The results of the study suggest that a combination of surgical and medicinal interventions may be the most effective means of managing this condition.

CONCLUSION

Our comprehensive study, conducted over six months on a sample of the general population, involved gathering data from a total of 60 patients. Our meticulous analysis and findings indicate that cancer is a hazardous disease caused by the uncontrolled division of cells, leading to severe damage to the body tissue. Furthermore, our research reveals that cancer has a profound impact on the body, resulting in significant changes that affect the patient's health and well-being.

The results of our study are highly significant, indicating that medication consumption leads to a noteworthy increase in the white blood cell (WBC) count among patients, with a value as high as 22000, compared to the baseline value of 17000. Additionally, the red blood cell (RBC) level, which plays a vital role in the body's oxygen transport system, was at its peak, at 8.1 mill (cell/MCL) before medication, but decreased to 7.1 mill (cell/MCL) after medication, indicating the effects of medication on the patient's body.

In the treatment of cancer patients, chemotherapy is commonly used, and our research shows that during the initial stage, patients typically underwent an average of 3-4 chemotherapy sessions. However, with medication, the average number of chemotherapy sessions decreased to one, indicating the benefits of timely and effective intervention.

Out of the total number of patients, 36 were female and 24 were male, mostly aged between 57-69 years. Notably, most patients belonged to blood group A+ (27 patients), suggesting a possible link between blood group and cancer incidence. (Observation / statement is based on the study conducted).

Our research also sheds light on the fact that most medical oncologists prescribe traditional dosing for better efficiency and availability. However, conventional drugs are also prescribed, depending on the patient's needs and preferences. Overall, our study provides valuable insights into the effects of cancer on the body and the benefits of medication and chemotherapy in treating cancer patients. After thorough research and analysis, we have concluded that traditional pharmaceutical drugs are more effective and widely accepted in the treatment of various types of cancer. Our findings are based on a detailed study of the technical aspects involved in cancer treatment and the comparative analysis of the outcomes of conventional drugs and other treatments.

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