IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Human Journals
Research Article
July 2021 Vol.:21, Issue:4

Cancer Prevalence and Incidence, Management of Chemotherapy-Induced ADRs in Cancer Care Hospital

IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Vasireddy Tejaswini[1]*, Rangam Bhargavi[2], Jogipeta Sowjanya[3], A Sadanandam[4], B Rajkamal[5], B Rama[6]

Department of Pharmacy Practice, Pharmaceutical Sciences, Malla Reddy Institute of Pharmaceutical Sciences, Kompally, Secunderabad-500100, Telangana, India.

Submitted: 23 June 2021
Accepted: 30 June 2021
Published: 30 July 2021

Keywords: Cancer, Risk factor, Prevalence, Incidence rate, Chemotherapy, Adverse drug reactions, Management

ABSTRACT

Introduction: This study aims to determine the prevalence of various types of cancers and to study the incidence of chemotherapy-induced ADRs in different cancer patients along with their management. This research helps to target different groups of people at higher risk of developing cancer. It is performed by modifying the risk factors and following secondary prevention and chemoprevention strategies. **Methodology:** The study design is carried out as a Retrospective, Prospective, and Observational study which is conducted for 4 months. Subjects for this study were selected based on the inclusion and exclusion criteria. **Result:** A total of 220 case subjects were analysed for the study. The maximum number of patients belong to the age group of 54-64 (27.5%) where females take the lead with 111 (51%) cases most of the subjects in this region were diagnosed with cervical cancer (19.6%) and tobacco smoking as the highest risk factor with 16%. 145 subjects underwent chemotherapy and 80 developed ADRs. The most common ADR was found to be nausea with or without vomiting (14.3%). The incidence rate of chemotherapy-induced ADRs was found to be 121.38 and subjects of age 52-61yrs and Males (60%) are majorly affected by ADRs during this study. **Conclusion:** This study showed the most common type of cancer and risk factor responsible for cancer in this specified area. Apart from this we also found the highest affected age group and gender. The incidence rate of chemotherapy-induced ADRs, commonly occurring ADRs of different chemotherapy drugs were also determined. Age group and gender which are more affected by chemotherapy ADRs were determined along with their management.

INTRODUCTION

Cancer is the prime cause of mortality and morbidity globally, including in India. According to WHO, there were about 10 million deaths recorded in 2020 due to cancer of which 70% of deaths belong to developing and underdeveloped countries. This is majorly due to a lack of awareness among people regarding the risk factors, signs, and symptoms which are used for early detection of cancer and lifestyle changes that are practiced to prevent cancer. In cancer prevention and control, epidemiology plays a crucial role. It describes the distribution of cancer and explores its risk factors.

In the past 50 years, many risk factors for cancer were analysed and interpreted through epidemiological research. Epidemiological research helps to target different groups of people who are at higher risk of developing cancer and it is performed by modifying the risk factors along with following secondary prevention and chemoprevention strategies.

1.1 What is cancer? [1]

WHO stated that cancer is a generic term used to represent a large group of diseases [>200] that can affect any part of the body. A normal cell undergoes mutation turning into a cancerous cell ignoring the body's signal to stop proliferating and this cell multiplies in number to form a tumor in organs and tissues. These cancerous cells are mainly characterized by the uncontrolled proliferation of cells. This complete process of converting a normal cell into a tumor cell is called carcinogenesis or tumor genesis [2].

Cancer often takes years to develop and the length of the time mainly depends and differs widely based on the identity, order, and speed at which the mutations accumulate. Generally in a healthy person's body, normal cells will grow and divide in a controlled orderly fashion and when a cell grows old (or) gets damaged then it undergoes a typical systematic process of cell death which is termed as apoptosis [3].

When the DNA which is the genetic material of the cell is damaged producing a defective cell (or) a mutated cell which eventually results in potentially disrupting normal cell growth and division. When there are more of these mutations then these mutations get accumulated and can even turn normal cells into pre-cancerous cells. These precancerous cells sometimes stay inactive where sometimes they multiply and evolve into cancer cell accumulation of these cells resulting in cancer [4].

1.2 Stages of cancer [7]:

The progression of the disease in the body can be determined based on the cancer stage:

1. **Stage 0:** This stage is known as the Precancerous stage involving mild to severe [carcinoma in situ] dysplasia. Here the cells are neither normal nor completely converted into cancerous cells; they exist between normal and cancer cells.

2. **Stage 1:** Localized stage. Cancer in this stage is confined to the area where it started. Adhere there will be no sign of spread.

3. **Stage 2:** Early locally advanced stage. Here, cancer starts spreading to the surrounding tissues or lymph nodes.

4. **Stage 3:** Late locally advanced stage where the regional spreading of the cancer cells will be more advanced.

5. **Stage 4:** Metastasized stage. Here cancer starts spreading to distant body parts by a process called metastasis.

1.3 Types of cancer:

WHO estimates that there are about 100 types of cancers in the world and they are named according to the type of cell or based on the organ or tissue that is involved in cancer formation.

Types of cancer-based on the cell involved:

1. Carcinoma: Epithelial cells are involved in this type of cancer. These epithelial cells make up the inner and outer surfaces of the body.

2. Sarcoma: Cancers that form in bone and soft tissues are termed sarcomas, these also include lymph vessels, blood vessels, fibrous tissue (tendons and ligaments), fat, and muscle.

3. Leukemia: Leukemia is the term used to denote the cancers that originate in the bone marrow where blood-forming tissue exists.

4. Lymphoma: Cancer that begins in lymphocytes (T cells or B cells) is known as lymphoma. Lymphocytes, which are one kind of white blood cell that helps to fight the disease as the body's immune mechanism.

5. Multiple Myeloma: Cancer that originates in plasma cells is termed multiple myeloma, which is another type of immune cell.

6. Melanoma: Cells that make the pigment that gives skin its color (melanin) are called melanocytes; they are specialized cells. Cancer that originates in the melanocytes is known as melanoma.

7. Brain and Spinal Cord Tumors: The abnormal growths of the tissues present in the skull and bony spine region is named differently according to the cell or origin of the cell in the CNS affected.

8. Additional Types of Tumors:

Germ Cell Tumors: Tumors that originate in the cells of genital organs are known as germ cell tumors.

Neuroendocrine Tumors: Some cells in the body respond to the signal that is released by the nervous system and release hormones. Tumors in these cells are called neuroendocrine tumors.

Carcinoid Tumors: These are the type of neuroendocrine tumors that grows slowly and seen mostly in the gastrointestinal system (most often in the rectum and small intestine).

Pathophysiology of cancer [5]:

Researchers state that the pathophysiology of the tumor is linked with the mutation of the DNA of the cell. Changes in the immune system of cancer are another major pathophysiology of cancer.

Usually, a normal cell when exposed to a carcinogen which is either exogenous or endogenous agent will be damaged then as the body's normal mechanism the body starts repairing the cell, and this repair is followed by orderly suppression of anti-tumor immunity. When the cell is continuously exposed to the carcinogens, there will be continuous tissue damage so the cells will continuously proliferate to repair the cells that are damaged making a way for the survival of cancerous cells.

1.4 Causes for cancer [8]:

Some factors are responsible for causing cancer and the substances that cause cancer are termed carcinogens; these carcinogenic agents will cause mutations in the DNA of the cells eventually leading to cancer. These factors involve:

Genetic factors: Ex: mutations in P ^{53} 53-kd gene

These account for a small amount of Kansas (about 10% of all cancers). Here cancer occurs on a hereditary basis where the family has a history of cancer.

- Oncogenes: These genes can activate:
  - Chromosomal translocation
  - Point mutation
  - DNA rearrangement
  - Promotes insertion
- Tumor suppressor genes:
  - Encode proteins
  - Inhibit cell transformation
  - Enhanced ceasing of cell growth and differentiation
  - Induce programmed cell death

Physical carcinogens: These involve

- Radiation:
  - X-rays, Ionizing radiation, Ultraviolet rays, alpha rays exercise
- Mineral fibers:
  - Asbestos fibers

Chemical carcinogens: These involve chemical components such as:

- Tobacco, alcohol, food coloring agents, flavoring agents, and other carcinogens

Biological carcinogens: These involve microorganisms that cause cancer.

- Bacteria:
  - *Helicobacter pylori*
- Virus:
  - Herpes virus, HBV, HCV, HPV, and other viruses.
- Fungi:
  - *Aspergillus flavus*

- Parasite:
  - Schistosomes

1.5 Symptoms of cancer [9]:

Symptoms of cancer are usually seen in other conditions such as benign tumors, infections, injuries, and other conditions. cancer generally does not cause any pain but certain symptoms used to detect cancer:

- Changes in Breast:
  - Feeling firm or presence of a breast lump.
  - Changes in nipple or presence discharge
  - Skin that feels itchy, red, scaly, dimpled, or puckered
- Changes in Bladder:
  - Trouble to urinate
  - Pain during urination
  - Haematuria
- Occurrence of Bleeding or bruising without any cause.
- Changes in Bowel:
  - Presence of stools with blood
  - Irregular bowel habits
- Persistent Cough or hoarseness
- Problems during eating:
  - Presence of heartburn or indigestion for more duration
  - Dysphagia
  - Abdomen pain
  - Nausea and vomiting
  - Anorexia
- Intense and Persistent Fatigue
- Fever or night sweats with unknown cause

- Changes in Mouth:
  - Presence of a white or red patch on the tongue.
  - Presence of numbness, pain, and unusual bleeding.
- Neurological problems:
  - Headaches
  - Seizures
  - Vision changes
  - Hearing changes
  - Bell's palsy
- Changes in Skin:
  - The presence of a flesh-coloured lump.
  - Sudden change in a mole.
  - Presence of a sore that does not heal.
  - Jaundice
  - Presence of Swelling or lumps anywhere in the body such as in the neck, underarm, stomach, and groin
- Sudden weight gain or weight loss for an unknown reason

1.6 Cancer treatment:

With the advancement in the knowledge about cancer, there are so many types of treatments developed to treat cancer including Chemotherapy, Radiation therapy, Surgery, Hormone therapy, Immunotherapy, and Stem cell transplantation.

1.7 Chemotherapy:

Chemotherapy is often used for treating cancer. In Chemotherapy drugs travel the whole body to eliminate tumor cells which spread to other parts of the body by metastasis. Because of this reason chemotherapy is considered different from surgery and radiation.

Goals of chemotherapy:

1. **Cure:** Chemotherapy is used to destroy tumors without recurrence [2] which is highly

impossible.

2. Control or Adjuvant therapy: Chemotherapy is used to control the disease as adjuvant therapy.

3. Palliation: Chemotherapy can also be used to ease symptoms caused by cancer. Anti-emetic drugs or pain medications are palliatives.

- Chemotherapy is generally administered to the patient in regular time intervals and this process is termed a cycle. Different classes of chemotherapy drugs and their adverse drug reactions (ADRs) were listed in Table-1.

Table No. 1: List of chemotherapy drugs and their ADRs

S: No	Class of drug	Examples of drug	Mechanism of action	ADRs
1.	**Alkylating agents**			
	a)Nitrogen mustards	Mechlorethamine cyclophosphamide Melphalan Chlorambucil	Alkylates DNA by forming interstrand cross-links	● COMMON**:** anemia [within 4-7 days], Nausea and vomiting [within 3 hrs], alopecia, mouth ulcers, Discolouration of infusion vein. Redness, dryness, irritation, infertility. ● RARE**:** fear, diarrhoea, poor appetite, metallic taste, tinnitus ● DELAYED EFFECTS**:** leukemia
	b) Nitrisoureas	Carmustin Lomustin Semustin	Covalently deactivate enzyme thiolate active sites by alkylation thus inhibiting the changes in the DNA repair process.	● COMMON**:** Nausea and vomiting [within 2-4hrs of infusion], Facial flushing, Pain, and burning at the injection site, low blood count [WBC and Platelets] ● RARE**:** Liver problems, Anaemia, Hypotension, Dizziness, Eye problems. ● VERY RARE**:** Pulmonary toxicity and Leukemia
	c) Alkyl Sulfonates	Busulfan	Alkylation of DNA leading to breaking	● COMMON: Low blood [within 7- 10 days], nausea,

			of DNA molecules and crosslinking of the DNA strands and resulting in inhibition of DNA replication and transcription of RNA.	vomiting, diarrhea, poor appetite, mouth ulcers, infertility. ● RARE: Discoloration of skin, skin rash, itching. ● VERY RARE: Lung and liver problems, fatigue, seizures, risk of secondary cancer.
	d) Triazine	Dacarbazine Procarbazine		
	e) Ethylenimine	Thio-TEPA	Acts as an alkylating agent and interferes with DNA replication and RNA transcription	● COMMON: Anemia, alopecia, nausea, vomiting, mouth sores, allergic reactions, bladder irritation, skin rash, and bronzing of the skin. ● DELAYED EFFECTS: Risk of developing leukemia.
2.	**Antimetabolites**			
	a) Folate antagonist	Methotrexate	Inhibit enzyme dihydrofolate reductase and prevent DNA synthesis	● COMMON: Mouth ulcers, low platelet count, fatigue nausea, anemia, fever, constipation, swelling. ● RARE: Cough, nose bleeds, vomiting, SOB, low potassium, itching, elevated liver enzymes, increased heart rate.
	b) Purine antagonist	6-Mercaptopurine 6-Thioguanine Azathioprine	Acts in two ways; 1. Prevent the production of purine-containing nucleotides. 2. And also gets incorporated into the DNA molecule during DNA synthesis	● COMMON: Anaemia, hepatotoxicity. ● RARE: Nausea, vomiting, anorexia, diarrhea, mouth ulcers, infertility, skin rash, a dark discoloration of the skin.
	c) Pyrimidine antagonist	5-Fluorouracil Cytarabine	As a false precursor, it gets incorporated into DNA or RNA or by	● COMMON: Flu-like symptoms, fever [6-12 hrs of the first dose], fatigue, nausea, vomiting, anorexia, skin rash,

			preventing the incorporation of proteins involved in nucleotide metabolism.	anemia, temporary increase in liver enzymes, Haematuria, or proteinuria. ● RARE: Diarrhoea, weakness, Alopecia, mouth ulcers, insomnia, SOB.
3.	**Antitumor-Antibiotics**			
	a)Anthracyclines	Daunorubicin Doxorubicin (Adriamycin) Doxorubicin Epirubicin Idarubicin Valrubicin	DNA and RNA synthesis will be prevented by inserting between base pairs of DNA/RNA strands. They create iron-mediated free oxygen radicals, damaging DNA and cell membranes	● COMMON: Injection site pain, nausea, vomiting, anemia, alopecia ● RARE: Eyes watering, mouth sores, urine color changes, nail bed darkening, skin discoloration, fertility problems. ● SERIOUS: Decrease in heart-pumping capability, risk of developing leukemia, Tumor lysis syndrome [24-48 hrs of therapy]
	b)Non-anthracyclines	Bleomycin Dactinomycin Mitomycin-C Mitoxantrone	These drugs bind with DNA, which is involved in the synthesis of RNA [by preventing RNA polymerase elongation] and simultaneously with protein synthesis.	● COMMON: Low blood count [within 7 days], Alopecia, nausea, vomiting, fatigue, mouth ulcers, liver problems, diarrhea, risk of infection, loss of fertility. ● RARE: loss of appetite, skin problems, sensitivity to sunlight, Darkening of skin. ● DELAYED EFFECTS: Higher risk of developing a secondary cancer
4.	**Plant alkaloids**			
	a) Topoisomerase I inhibitors (*camptothecins*)	Irinotecan Irinotecan Topotecan	Block ligation step of the cell cycle, which generates single and double DNA strand breaks, leading to apoptotic cell death. They inhibit the topoisomerase I	● COMMON: Low blood count, nausea, vomiting, alopecia, diarrhoea. ● RARE: Constipation, fever, fatigue, abdominal cramps, bone pain, weakness, mouth ulcers, anorexia, rash, dyspnoea, headache cough.

			enzyme.	
	b) Topoisomerase II inhibitors (*epipodophyllotoxins*)	Etoposide (VP-16) Mitoxantrone Teniposide	They inhibit the Topoisomerase II enzyme.	● COMMON; Low WBC count, low platelet count, alopecia, menopause, infertility, nausea, vomiting, hypotension. ● RARE; Mouth sores, diarrhea, poor appetite4, radiation recall. ● OTHERS: Metallic taste, swelling of the injection site, peripheral neuropathy ● DELAYED EFFECTS: Risk of developing leukemia.
	c) Taxanes	Cabazitaxel Docetaxel Nab-paclitaxel Paclitaxel	They inhibit the formation of mitotic spindles and bind to the microtubules to prevent depolymerization, thus preventing mitosis and inducing apoptosis of cells.	● COMMON: anemia, alopecia, joint pains and muscle pains, peripheral neuropathy, nausea, vomiting, diarrhea, mouth ulcers, allergic reactions. ● RARE: Swelling of feet or ankles, abnormal liver function, hypotension, skin darkening discoloration of nail beds.
	d) Vinca alkaloids	Vinblastine Vincristine Vincristine Vinorelbine	They function by arresting the division of cells in the metaphase of the cell cycle by binding to tubulin and preventing its polymerization into microtubules.	● COMMON: Hair loss [partial or complete], constipation, anemia, abdominal pain, decrease in weight, nausea, vomiting, mouth ulcers, diarrhea, anorexia, taste changes. ● RARE: Peripheral neuropathy
5.	**Miscellaneous agents**	Hydroxyurea [Hydrea] Mitotane Cisplatin Carboplatin Mitoxantrone L-Asparaginase		

1.8 Types of chemotherapy drugs [4]:

❖ Drugs that interfere with mitosis:

- Eg:

◆ Vincristine,Vinblastine

◆ Taxanes: Taxol,

◆ Paclitaxel

❖ Drugs that act DNA synthesis(antimetabolites):

- Eg:

◆ 5-Fluorouracil (5-FU), Capecitabine, Methotrexate,

◆ 6-Mercaptopurine, 6-Thioguanine, Cytosine arabinoside, Gemcitabine

❖ Drugs that damage DNA or alters function:

- Eg:

◆ Mitomycin C

◆ Cis-platinum, Carboplatin, Oxaliplatin

◆ Doxorubicin

◆ Cyclophosphamide, Ifosfamide

◆ Bleomycin

◆ Irinotecan

◆ Etoposide

◆ Dacarbazine

◆ Temozolomide

◆ Actinomycin D

❖ Inhibitors of receptor tyrosine kinases:

- Eg:

◆ Gefitinib, Imatinib, Erlotinib

◆ Sunitinib, Sorafenib,

- ◆ Regorafenib, Lenvatinib, Lapatinib, Axitinib
- ❖ Protease inhibitors: Bortezomib
- ❖ Differentiating agents:
- Eg: All trans-retinoic acid
- ❖ Farnesyltransferase inhibitors:
- Eg: Lonafarnib, Tipifarnib
- ❖ Antibodies that acts cell surface antigens:
- ❖ Eg: Trastuzumab, Cetuximab, Bevacizumab, Rituximab, Alemtuzumab Apoptosis Inducers:
- Eg: Arsenic trioxide
- ❖ HDAC inhibitors:
- Eg: Panobinostat, Vorinostat, Entinostat
- ❖ PI3K inhibitors: Idelalisib
- ❖ mTOR inhibitors:
- Eg: Temsirolimus, Everolimus
- ❖ MEK inhibitors:
- Eg: Trametinib, Selumetinib
- ❖ RAF inhibitors:
- Eg: Dabrafenib, Vemurafenib

1.9 What is an Epidemiological study?

A branch of medicine that usually deals with the incidence, distribution, characteristics and control of any disease in a population is known as epidemiology. These epidemiological studies provide information regarding the risk factors, prevalence, characteristics, causes, and control of any kind of disease. So, disease control and prevention strategies are established.

1.10 Types of epidemiological studies:

Observational studies: Here the researcher observes the effect of any factor on the occurrence of the disease or the intervention without altering it. It involves cohort studies and case-control studies.

Interventional studies: Here the researcher will examine a study where the intervention is introduced by himself. These involve randomized and non-randomized studies.

1.11 Role of an epidemiological study in cancer prevention:

Cancer became a leading cause of mortality and morbidity globally, including in India. According to WHO, about 10 million deaths were recorded in 2020 due to cancer, of which 70% of deaths belong to developing and underdeveloped countries. This is majorly due to a lack of awareness among people regarding the risk factors, signs, and symptoms which are used for early detection of cancer and lifestyle changes that are practiced to prevent cancer. In cancer prevention and control, epidemiology plays a crucial role. It describes the distribution of cancer and explores its risk factors. In the past 50 years, many risk factors for cancer were analysed and interpreted through epidemiological research. Epidemiological research helps to target different groups of people who are at higher risk of developing cancer and it is performed by modifying the risk factors along with following secondary prevention and chemoprevention strategies.

AIM

The main aim of this study is to determine the prevalence of various types of cancers and to study the incidence of chemotherapy-induced ADRs in different cancer patients along with their management.

RESEARCH OBJECTIVE:

To achieve the targeted aim, we have divided our present work into a few objectives, which are discussed below.

Primary objective:

- To determine the prevalence of various types of cancers in the specified area.
- To study different risk factors that are contributing to cancer in the selected patient.
- To study the incidence of chemotherapy-induced ADRs in different cancer patients.
- To evaluate the management of different chemotherapy-induced ADRs.

Secondary objective:

- To observe the severity of chemotherapy-induced ADRs in different groups of patients undergoing chemotherapy.
- To determine the highest contributing risk factors for different cancers by comparing different risk factors.

LITERATURE REVIEW

1. Saravana Kumar Ramasubbu et al. (2020) [20]

In this study, 500 participants developed ADRs due to cancer chemotherapy from the time period of April 2018 to September 2019. All the demographics, Drugs used, and the ADRs encountered by the patient were recorded in a predesigned form. Here they found anemia as the frequently occurring ADR which is followed by nausea vomiting and leukopenia and the common drugs which were involved in causing ADRs are paclitaxel, carboplatin, and doxorubicin. Safety data regarding the uses of anticancer drugs is provided in this study.

2. K V Deepa et al. (2020) [13]

This is a systematic review article that was conducted during 2020 and data was collected from the time period of 2016-2018 and 1078 citations were collected. According to this study, the literature on cancer epidemiology from India lacks data on the Northern and North-eastern parts of the country. Studies with proper design and a large sample size are currently required to represent all parts of the country.

3. Amanda Hanora Lavan et al. (2019) [17]

This study is a prospective, observational study with patients above 16 years oncology centre and other older adults aged 70 years who were involved in this study. About 350 subjects' data were collected. In this study, the percentage prevalence of multimorbidity and polypharmacy in patients with cancer and prevalence predictability and preventability of adverse drug reactions contributing to the hospitalization were studied in this article.

4. A L- Janabi Ali Abdul Hussain et al. (2017) [11]

This study is a prospective observational study where a total of 12,000 specimens which were collected during a time period of 2008 to 2015 in Karbala city in Iraq from patients suspected to have cancer are histopathologically examined. Cancer diseases. prevalence, incidence rate, and ASP were diagnosed in this study which was determined for 838 confirmed Positive

cases. During this period older age groups are more affected compared to their ages (< 30 years) and males with bladder cancer, females with breast cancer contributed to high prevalence and incidence.

5. Deepti Chopra et al. (2016) [15]

This is a prospective observational study. this research is conducted for about two years [Jan 2011 to Jan 2013] medications used for different types of ADR, in 591 cases they found about 58.6 percent incidence of cancer patients and prevalence of various was more in female patients' comparative men and patients treated for breast cancer were reported with the highest ADR incidence and cisplatin was found to be the repeatedly used drug that causes ADRs. The most common ADR was found to be nausea, vomiting and the most affected system was GIT. About 15.2% of radius required treatment and 12.9% of areas are considered serious.

6. Sewunet Admasu Belchew et al. (2016) [12]

This Study is a cross-sectional model that is conducted for 2 years during a time period of Sept 2013 to Aug 2015 on the cancer patients who are undergoing chemotherapy at Gonda University's referral hospital oncology centre. Chemotherapy-related ADRs are a major concern among cancer patients involved in this study. The data is collected directly from the patients undergoing chemotherapy at the study site. ADRs are assisted by using the casualty assessment scale Naranjo's algorithm.

7. Priyanka raj MPH et al. (2014) [22]

This study is a systematic review where 15 generals characterized by occupation, industry, or personal exposure of cancer risk are utilized for review from 1991 to 2009. This article stated that the occupational cancer epidemiology articles published yearly declined from 2003. Epidemiological articles and occupational cancer can help to estimate the cancer risk and workplace carcinogenicity.

8. Yo Ko et al. (2014) [19]

This study is a prospective model which is conducted for 5 months in 2 oncology wards. Out of 151 drug-related admissions, 137 subjects were identified with cancer. The goal of this study is to estimate the cost-effectiveness and duration of stay in hospitals due to drug-related problems and their associated factor in patients with cancer. This article states that hospitalization for cancer patients is costly and more attention should be given to improve

and develop the prevention measure for drug-related mortality and morbidity in patients with cancer.

9. Alexandre Chan et al. (2014) [16]

This study was a prospective cohort study model which was performed in 2 oncology wards during July and December 2012. All the patients who were diagnosed with solid tumor cell lymphoma and required unplanned hospitalization were included in this study. This study states that the incidence of DRP induced and Planet hospitalizations for cancer patients were about 12.4% and approximately more than half preventable events.

10. J. S. Thakur et al. (2008) [21]

This study model is a cross-sectional and case-control study that was carried out in 12 villages of Northern India. In Talwandi Sabo, the use of pesticides, heavy metals, tobacco, and alcohol are majorly accountable for the higher prevalence of cancer. The cancer registry should be maintained to elucidate the effect of pesticides and heavy metals in the etiology of cancer.

11. Phyllis M Lau et al. (2004) [18]

This study was conducted on the hospitalized patients at Peter MacCallum Cancer Centre cheating study period of 28 February to 2nd June 2000 the patients were interviewed about the symptoms related to their drug therapy. All the ADRs were assessed for their casualty, predictability, preventability, and severity. About 171 admissions were interviewed and 454 ADRs were identified which is 74.3 %. So, in this study, the 10 most common areas found were alopecia, nausea and vomiting, tiredness, constipation, dizziness, myelosuppression, skin rashes, loss of appetite, mucositis, and diarrhea.

12. Ray M Merrill et al. (2000) [10]

This is a retrospective, observational study where the patients are diagnosed in 5 states and 4 metropolitan areas in the US from 1973 to 1994. This study utilized tumor registry data on the SEER program to estimate cancer prevalence. reasonably unbiased prevalence proportion estimates were obtained by this model.

13. S. A. Oliveria et al. (1997) [14]

This is an epidemiological study whose design follows cross-sectional, descriptive, ecological, and analytic (cohort, case-control, and intervention) studies. This study states the importance of epidemiological study in public health care and cancer prevalence.

epidemiological research plays a key role in Cancer prevention by discovering the risk factors and distribution of Cancer. Through more than 2/3 of cancer can be prevented.

14. L. Arlene Nazario et al. (1997)

This study is a descriptive epidemiological, analytic study that is used to determine the distribution, determinants, and frequency of malignant diseases in specific kinds of the population. The study objective is to define the causative factors for formulating preventive strategies and to control the disease. By using this study, a qualified clinician can analyse the cancer risk factors and outline the basis for screen screening modalities in higher-risk populations and also determine the efficacy of Preventive intervention.

15. Christer Hublin Jaakko Kapiro (1994) [24]

This is a cohort study that was conducted in 13,888 monozygotic and dizygotic twins who were born before 1958. The methodology of this study included a questionnaire, narcolepsy scale Here they found the true balance of narcolepsy in the finished population prevalence is less compared than reported.

MATERIALS AND METHODS

220 samples of cancer cases were included for accomplishing the study effectively. It is an observational study, which will include the patients enrolled in the cancer care hospital. Simple random sampling will be carried out with the formation of clusters. The study will be emphasizing on exposure of patients to any type of cancer, cancer risk factors, chemotherapy drugs, and chemotherapy-induced ADRs. The study will focus on the prevalence of cancer and the incidence of chemotherapy-induced ADRs and their management. The detailed description is shown in the next section.

Proposed methodology:

Study Design: Retrospective (June 2019-June 2021), and Prospective Observational Study.

Study Period: March 2021 - June 2021

Sample Size: 220 subjects.

Study Site: The study and the data collection for this research are conducted in the following hospital.

“MALLA REDDY CANCER HOSPITAL AND RESEARCH INSTITUTE”, Suraram,

Hyderabad, Telangana.

Inclusion criteria: The patient population who are:

- Diagnosed with any type of cancer.
- Exposed to cancer risk factors.
- Undergoing chemotherapy.
- experiencing any kind of side effects induced by chemotherapy

Exclusion criteria: The patient population who are:

- Non-cancer patients.
- Not receiving any chemotherapy drugs.

Study process:

A retrospective and Prospective observational single centered study were carried out in the cancer care hospital. The patients who are diagnosed with any cancer and undergoing chemotherapy were identified during the case study period. The data observed was analysed for cancer risk factors, chemotherapy drugs, chemotherapy-induced ADRs, and their management. The subjects in this study were enrolled based on the inclusion and exclusion criteria. The permission to conduct this study was obtained from "MALLA REDDY CANCER HOSPITAL AND RESEARCH INSTITUTE", Suraram, Hyderabad, Telangana.

RESULTS

AGEWISE DISTRIBUTION OF CANCER:

A total of 220 cases were collected retrospectively and prospectively in 4 months during the study. Among them, we found people with different age groups affected by cancer and we grouped them into 8 groups with an interval of 10 years according to their age as given in the table. (Table-3)

Table No. 2: DISTRIBUTION OF CANCER-BASED ON AGE

AGE	PERCENTAGE	FREQUENCY
15-25	5.00%	11
25-34	9.20%	20
34-44	18.30%	40
44-54	17.00%	37
54-64	27.50%	60
64-73	14.70%	32
73-83	17.80%	17
83-85	0.50%	1

Here, we found that the age group between 54 - 64yrs were more prone to cancer with 27.5%, where the age group between 15-25 yrs recorded the least with 5.0% of prevalence. (Figure-1)

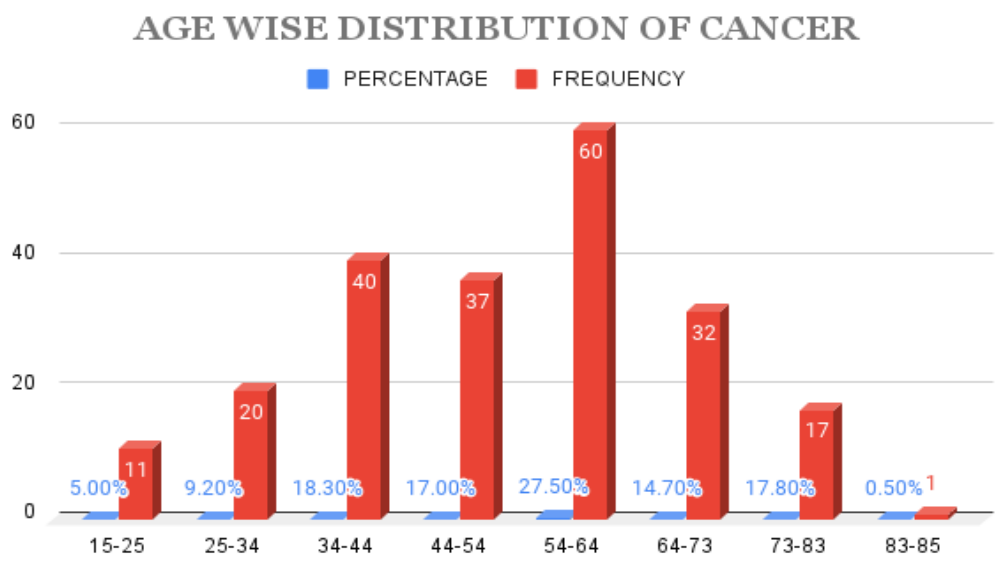


FIGURE No. 1: Graphical representation of Age-wise distribution of subjects

DISTRIBUTION OF CANCER BASED ON GENDER

Among a total of 220 cases who were admitted to the cancer care hospital from June 2019. We found a total number of 112 female subjects and 108 male subjects. The percentage distribution of cancer gender-wise was given in the table. (Table-4)

TABLE No. 3: Gender wise distribution of cancer

GENDER	FREQUENCY	PERCENTAGE
Female	112	49.10%
Male	108	50.90%

Here we found that 50.9% of females were affected by cancer. Which is more when compared to the males (49.1%) affected by cancer. (Figure-2)

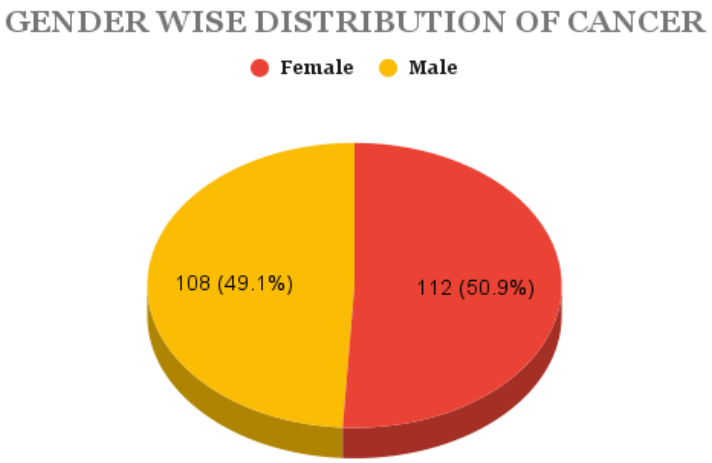


FIGURE No. 2: Pie chart representing the gender-wise distribution of cancer

TYPES OF CANCER:

In total cases of 220 which were collected retrospectively and prospectively, we found that subjects are admitted to the cancer care hospital with about 23 different types of cancers. Different types of cancers along with their percentage prevalence were listed in the table. (Table-5)

TABLE No. 4: Different types of cancers and their percentage prevalence

CANCER TYPE	PERCENTAGE	FREQUENCY
Adenocarcinoma	1.00%	2
Blood cancer	1.00%	2
Bone cancer	4.00%	8
Brain cancer	1.50%	3
Breast cancer	9.50%	19
Buccal cancer	1.50%	3
Cervical cancer	19.60%	39
Esophageal cancer	1.50%	3
Hodgkin's lymphoma	2.00%	4
Laryngeal cancer	2.00%	4
Lung cancer	15.60%	31
Non-Hodgkins cancer	4.50%	9
Ovarian cancer	2.00%	4
Pancreatic cancer	2.00%	4
Pharyngeal cancer	2.50%	5
Prostate cancer	3.00%	6
Rectal cancer	2.50%	5
Renal cancer	1.50%	3
Squamous cell carcinoma	4.50%	9
Stomach cancer	10.60%	21
Thyroid cancer	1.50%	3
Tongue cancer	4.00%	8
Vulvar cancer	2.00%	4

Here we found that the prevalence of cervical cancer takes the lead with 19.6% followed by lung cancer with 15.6%. and cancers affecting blood and adrenal gland were positioned least with only 1% prevalence. (Figure-3)

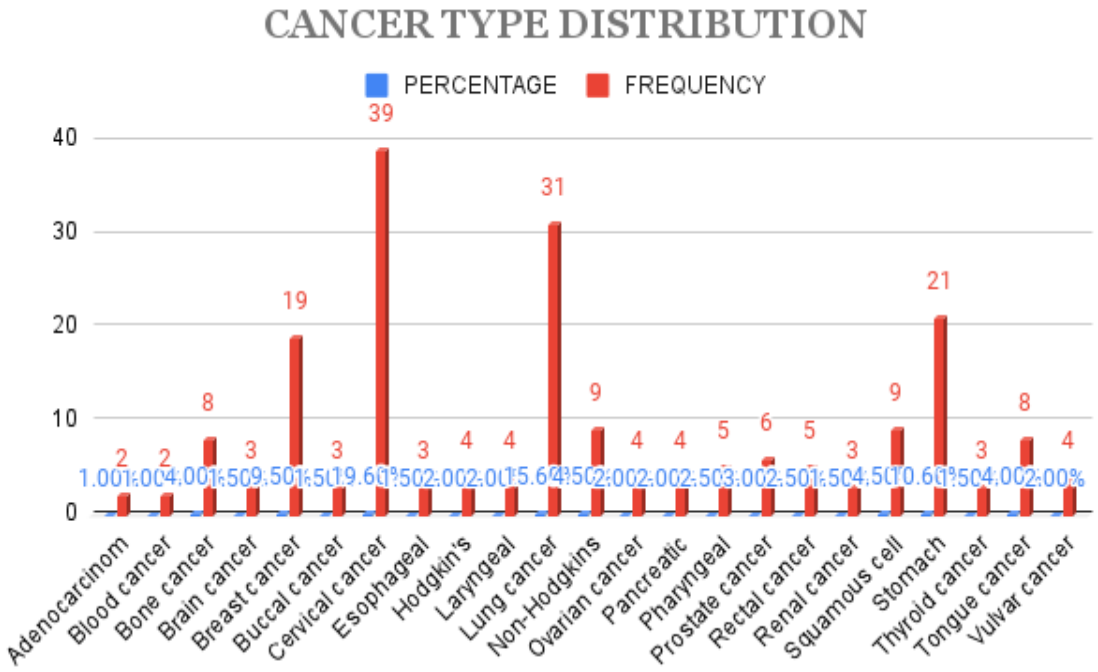


FIGURE No. 3: Graph representation of different cancer types and their percentage distribution

RISK FACTORS OF CANCER:

Among 220 cases that were collected during 4 months period retrospectively and prospectively, we found a total of 21 risk factors that are assumed as responsible for cancer in those subjects. A list of different risk factors and their percentage distribution was mentioned in the given table. (Table-6)

TABLE No. 5: Risk factors of cancer and their percentage distribution

RISK FACTOR	FREQUENCY	PERCENTAGE
Age	8	3.70%
Genetic changes	17	7.80%
HPV infection	7	3.20%
Alcohol	19	8.70%
Tobacco	35	16.00%
Autoimmune disorders	7	3.20%
Betel quid	8	3.70%
Gutka	10	4.60%
Birth control pills	8	3.70%
chemotherapy of another cancer	6	2.70%
poor diet	12	5.50%
viral infection	7	3.20%
excessive sun exposure	7	3.20%
Exposure to carcinogens	21	9.60%
bacterial infection	8	3.70%
Obesity	5	2.30%
Multiple full-term pregnancies	7	3.20%
No pregnancy	5	2.30%
PCOD	10	4.60%
Poor oral hygiene	5	2.30%
Stomach polyps	7	3.20%

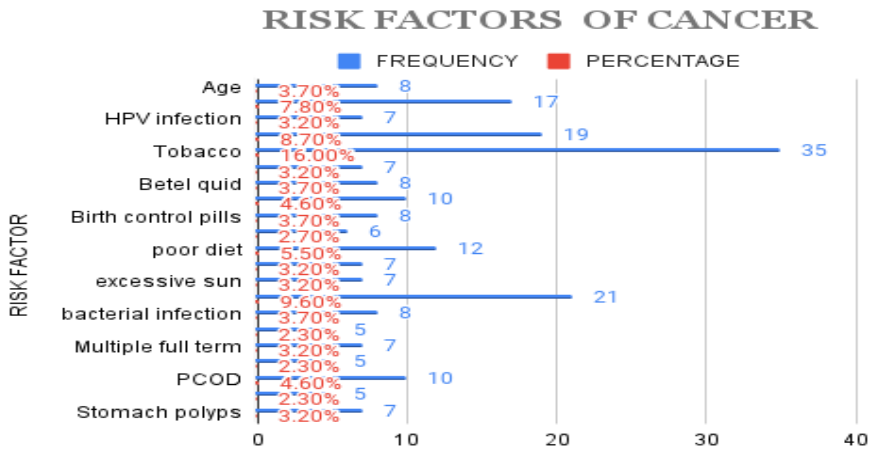


FIGURE No. 4: Bar graph representing different risk factors and their percentage distribution

Here, among 21 different risk factors, tobacco smoking opts first place with 16%, followed by exposure to carcinogens 9.6%. This is because most of the subject's occupation was mentioned as industrial workers. (Figure-4)

Pregnancy-related problems (26.8%) are majorly responsible for cervical cancer in this region. (Table-6.1 & Figure-4.1)

TABLE No. 5.1: Cervical cancer risk factors and their percentage

RISK FACTORS	FREQUENCY	PERCENTAGE [%]
Age	5	12.2
Hormonal imbalance	1	9.8
Oral contraceptives	6	14.6
Viral infection	6	14.6
Pregnancy-related problems	11	26.8
Autoimmune disorder	1	-
PCOD	7	17.1
Bacterial infection	4	-

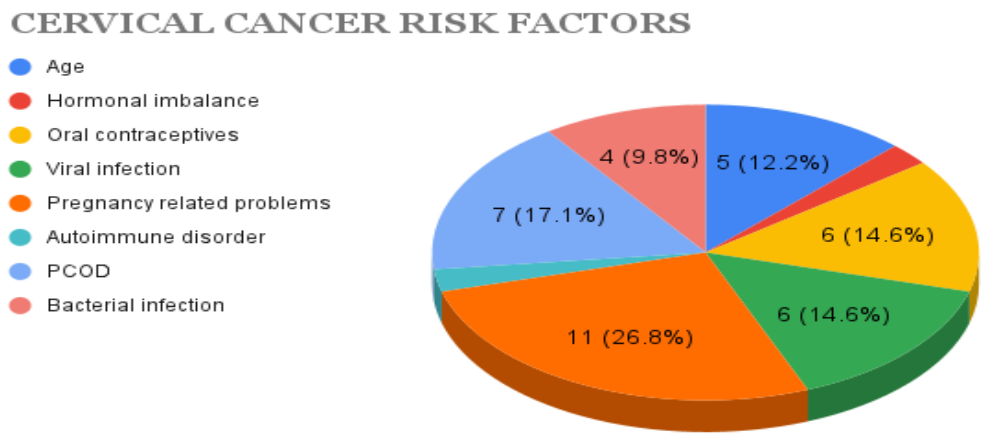


FIGURE No. 4.1: Pie chart representing risk factors responsible for cervical cancer

Tobacco smoking is the major risk factor accounting for about 35.7% of causing lung cancer which is followed by exposure to carcinogens (31.0%). (Table-6.2 & Figure-4.2)

TABLE No. 5.2: Lung cancer risk factors and their percentage

RISK FACTORS	FREQUENCY	PERCENTAGE [%]
Tobacco	15	35.7
Exposure to carcinogens	13	31
Poor nutrition	1	-
Betel quid	8	19
Gutka	5	11.9

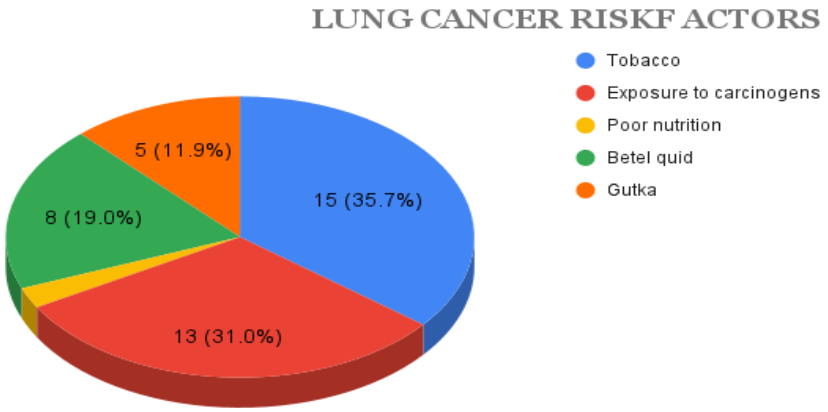


FIGURE No. 4.2: Pie chart representing lung cancer risk factors and their percentage

Drinking alcohol is the most common risk factor for stomach cancer accounting for 30.8% which is followed by stomach polyps (23.1%). (Table-6.3 & Figure-4.3)

TABLE No. 5.3: Risk factors of stomach cancer and their percentages

RISK FACTORS	FREQUENCY	PERCENTAGE [%]
H. pylori infection	4	15.4
Stomach polyps	6	23.1
Poor diet	3	11.5
Alcohol	8	30.8
Tobacco	5	19.2

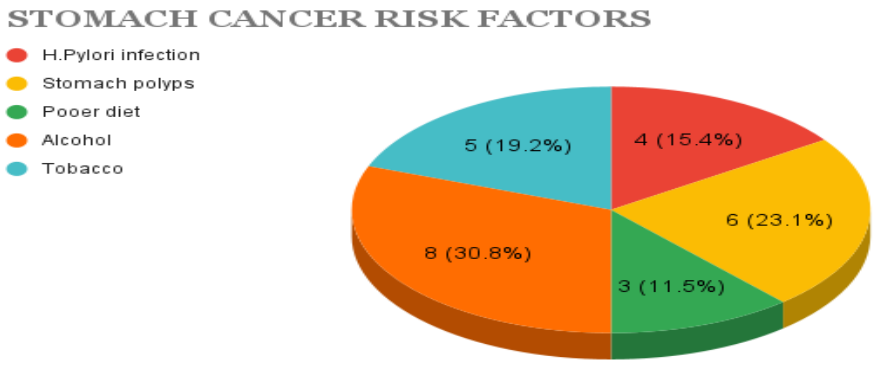


FIGURE No. 4.3: Pie chart representing stomach cancer risk factors and their percentages

and Age (36.8%) is the major risk factor for breast cancer followed by postmenopausal changes (31.6%). (Table-6.4 & Figure-4.4)

TABLE No. 5.4: Breast cancer risk factors and their percentages

RISK FACTORS	FREQUENCY	PERCENTAGE [%]
Age	7	36.8
Family history	2	-
Exposure to carcinogens	4	21.1
Postmenopausal therapy	6	31.6

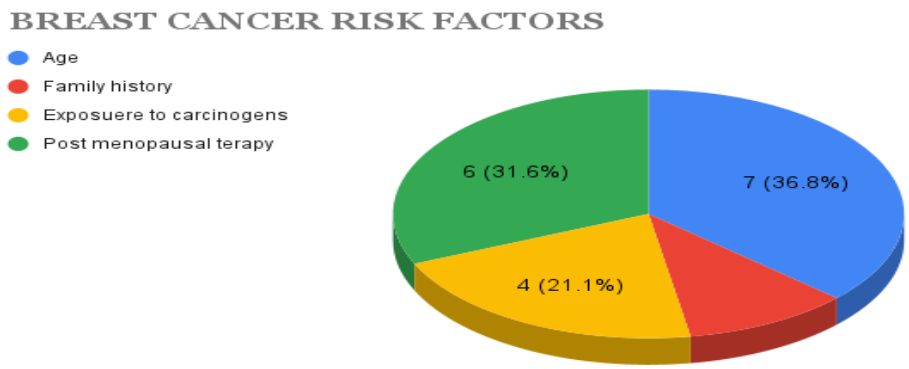


FIGURE No. 4.4: Pie chart representing breast cancer risk factors and their percentages

CHEMOTHERAPY DRUGS:

Among 220 cases 145 subjects were treated with chemotherapy and the data was collected prospectively. Table-7, representing a list of chemotherapy drugs that are used for treating different cancers. Cisplatin, which is a platinum-containing chemotherapy drug, is the majorly used drug for treating cancer accounting for 27.8% followed by paclitaxel (22.8%). (Figure 5)

TABLE No. 6: Chemotherapy drugs and their incidence percentages

DRUG	FREQUENCY	PERCENTAGE
5-Fluorouracil	16	6.10%
Cisplatin	73	2708%
Carboplatin	47	17.90%
Paclitaxel	60	22.80%
Oxaliplatin	12	4.60%
Etoposide	19	7.20%
Cyclophosphamide	7	2.70%
Capecitabine	4	1.50%
Docetaxel	5	1.90%
Doxorubicin	6	2.30%
Bleomycin	4	1.50%
Methotrexate	1	1%
Vincristine	9	3.40%

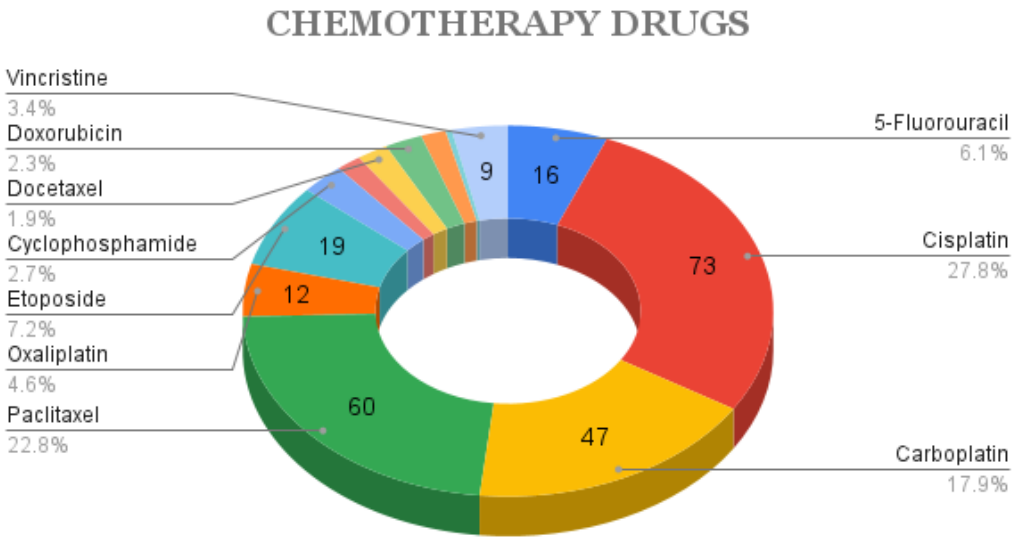


FIGURE No. 5: Pie chart representing Different chemotherapy drugs used for treating cancer

CHEMOTHERAPY-INDUCED ADRs:

Among 220 cases 145 cases were chemotherapy cases and among them, 80 showed chemotherapy-induced ADRs. There are about 17 different types of ADRs which are listed with their percentage incidence in Table-8 and a bar graph representing percentages of different kinds of ADRs. (Figure-6). According to this bar chart nausea with or without vomiting is the most common ADR accounting for 14.3% followed by body pains 14% and anemia 10.1%.

TABLE No. 7: Chemotherapy-induced ADRs and their percentage incidence

ADRs	FREQUENCY	PERCENTAGE
Body pains	14	11.80%
Bruising & Bleeding	7	5.90%
Diarrhea	2	1.70%
Nausea and vomiting	17	14.30%
Peripheral neuropathy	10	8.40%
difficulty urinating	3	2.50%
neutropenia	2	1.70%
Abdominal pain	4	3.40%
Weight loss	2	1.70%
Allergy	6	5.00%
Loss of appetite	11	9.20%
Constipation	2	1.70%
Cough & Hoarseness	5	4.20%
Increased risk of Infection	5	4.20%
Alopecia	9	7.60%
Anemia	12	10.10%
Injection site pain	3	2.50%
Mouth sores	5	4.20%

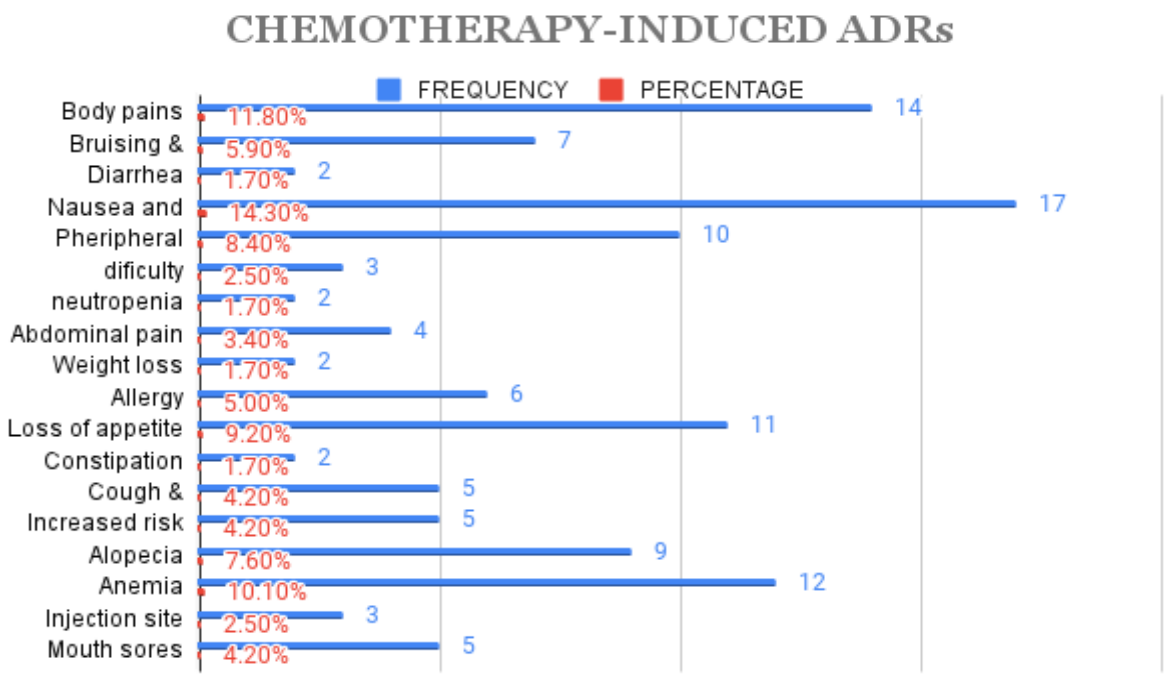


FIGURE No. 6: Bar chart on chemotherapy-induced ADRs and their incidence percentage

INCIDENCE RATE OF CHEMOTHERAPY INDUCED ADRs:

- Among 220 cases 145 subjects were treated with chemotherapy and the data was collected prospectively.

- Incidence: The incidence rate of chemotherapy-induced ADRs:

Total number of cases	220
No. of subjects underwent chemotherapy	145
No. of subjects experienced chemotherapy-induced ADRs	80

Incidence Rate =

$$\frac{\text{Total number of new cases of chemotherapy-induced ADRs during the given time period}}{\text{Total population at risk during the same time period}} \times \text{Population size}$$

$$= \frac{145 \times 220}{80}$$

Incidence rate = 121.38

Therefore, the incidence rate of chemotherapy-induced ADRs was found to be 121.38 which means out of 220 subjects 121 cases are at risk of developing chemotherapy-induced ADRs.

MOST AFFECTED AGE GROUP BY ADRs:

Among 80 subjects who evidenced chemotherapy-induced ADRs, the majority of the subjects belong to the Age group between the range of 52-61yrs (23.5%) which is followed by 43-52 yrs and 52-61yrs with an equal percentage of 18.5%. (Table-9 & Figure-7)

TABLE No. 8: Age-wise distribution of chemotherapy-induced ADRs

AGE	FREQUENCY	PERCENTAGE
15-24	6	7.40%
24-34	11	13.60%
34-43	8	9.90%
43-52	15	18.50%
52-61	19	23.50%
61-71	15	18.50%
71-80	3	3.70%
80-85	4	4.90%

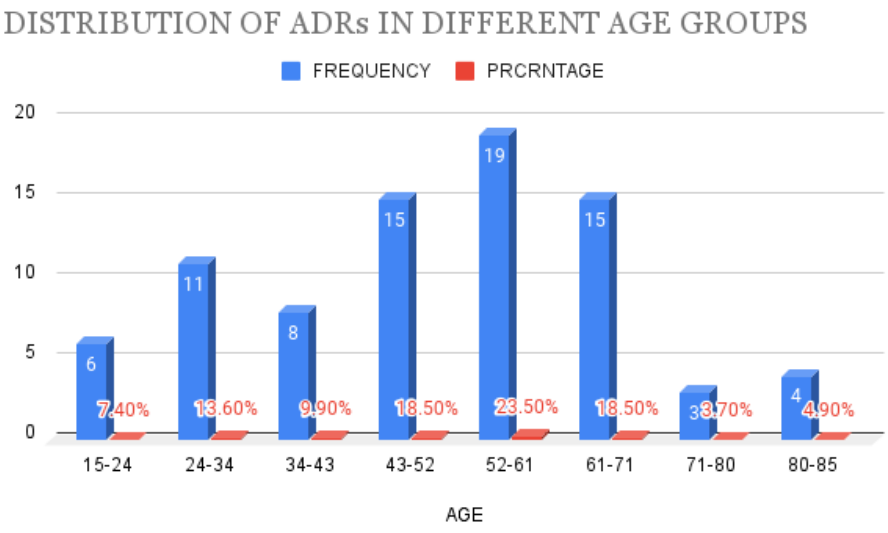


FIGURE No. 7: Bar graph representing the age-wise distribution of ADRs

GENDER MORE PRONE TO ADRs:

Among 80 cases of chemotherapy-induced ADRs 32 cases are of females, and 48 cases are of males. Here males had taken the lead with a percentage of 60% than females (40%). (Table-10 & Figure-8)

TABLE No. 9: Gender wise distribution of chemotherapy-induced ADRs

GENDER	FREQUENCY	PERCENTAGE
MALE	48	60%
FEMALE	32	40%

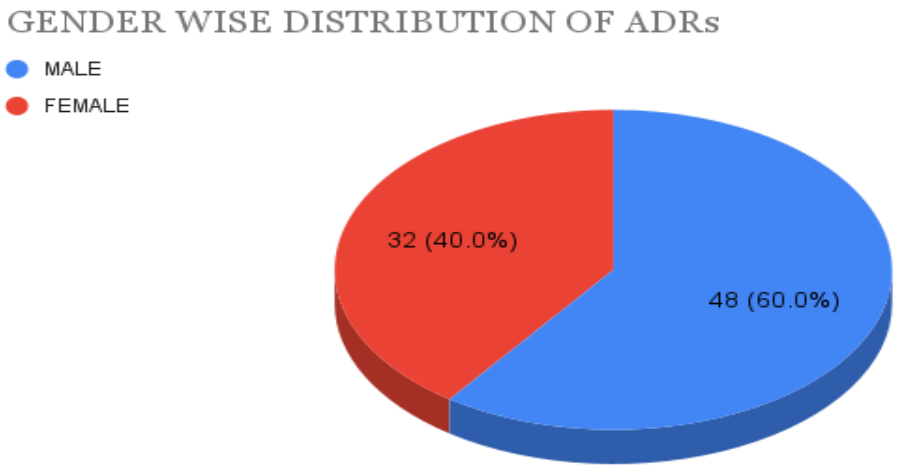


FIGURE-8: Pie chart representing the gender-wise distribution of ADRs

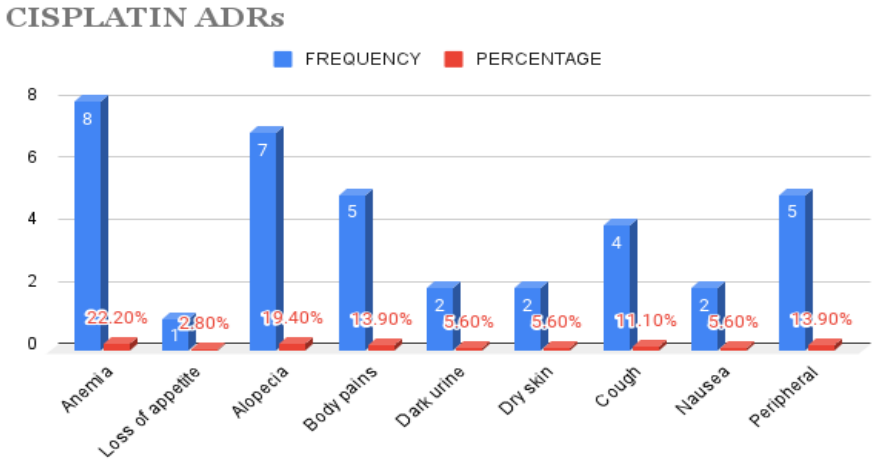
ADRs OF INDIVIDUAL DRUGS:

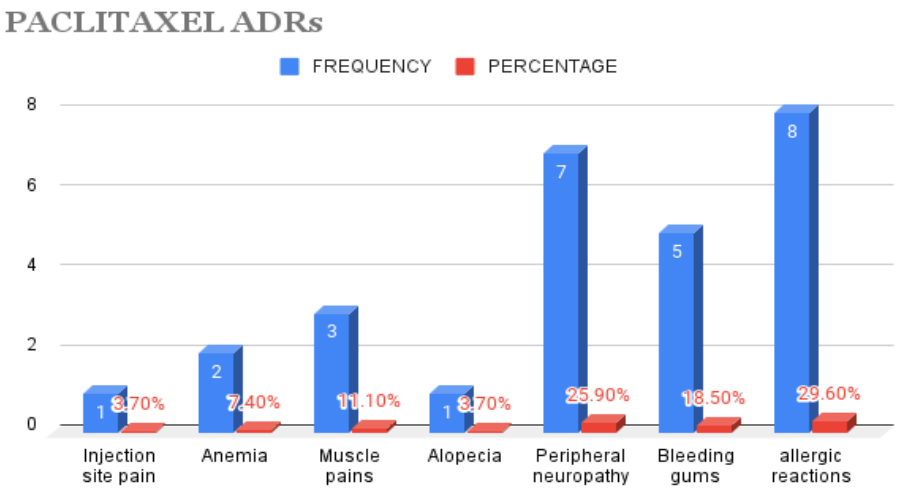
9 different ADRs are observed with the drug cisplatin where Anemia takes the lead with the percentage of 22.2% and for paclitaxel among 7 different types of ADRs Allergic reactions and peripheral neuropathy account for the top with 29.60% and 25.90% respectively. As for carboplatin among 4 different types of ADRs body pains (38.90%) and nausea, vomiting (27.80%) were with the highest percentage and for etoposide and 5-fluorouracil nausea and vomiting are the highest-ranking ADRs with the percentage of 42.90% and 43% respectively. (Table-11& Figure-9)

TABLE No. 10: ADR distribution of cisplatin, paclitaxel, carboplatin, etoposide, and 5-fluorouracil

	CISPLATIN	
ADRs	**FREQUENCY**	**PERCENTAGE**
Anemia	8	22.20%
Loss of appetite	1	2.80%
Alopecia	7	19.40%
Body pains	5	13.90%
Dark urine	2	5.60%
Dry skin	2	5.60%
Cough	4	11.10%
Nausea vomiting	2	5.60%
Peripheral neuropathy	5	13.90%
	PACLITAXEL	
ADRs	**FREQUENCY**	**PERCENTAGE**
Injection site pain	1	3.70%
Anemia	2	7.40%
Muscle pains	3	11%
Alopecia	1	3.70%
Peripheral neuropathy	7	25.90%
Bleeding gums	5	18.50%
allergic reactions	8	29.60%
	CARBOPLATIN	
ADRs	**FREQUENCY**	**PERCENTAGE**
Nausea&vomiting	5	27.80%
Body pains	7	38.90%
Diarrhea	2	11.10%
Abdominal pain	4	22.20%
	ETOPOSIDE	
ADRs	**FREQUENCY**	**PERCENTAGE**
Mouth sores	5	35.70%

Dark coloration of Urine and stools	2	14.30%
Nausea & vomiting	6	42.90%
constipation	1	7.10%
	5-FLUOROURACIL	
ADRs	**FREQUENCY**	**PERCENTAGE**
Nausea	6	42.90%
Mouth sores	2	14.30%
Loss of appetite	4	28.60%
Itching of skin	2	14.30%





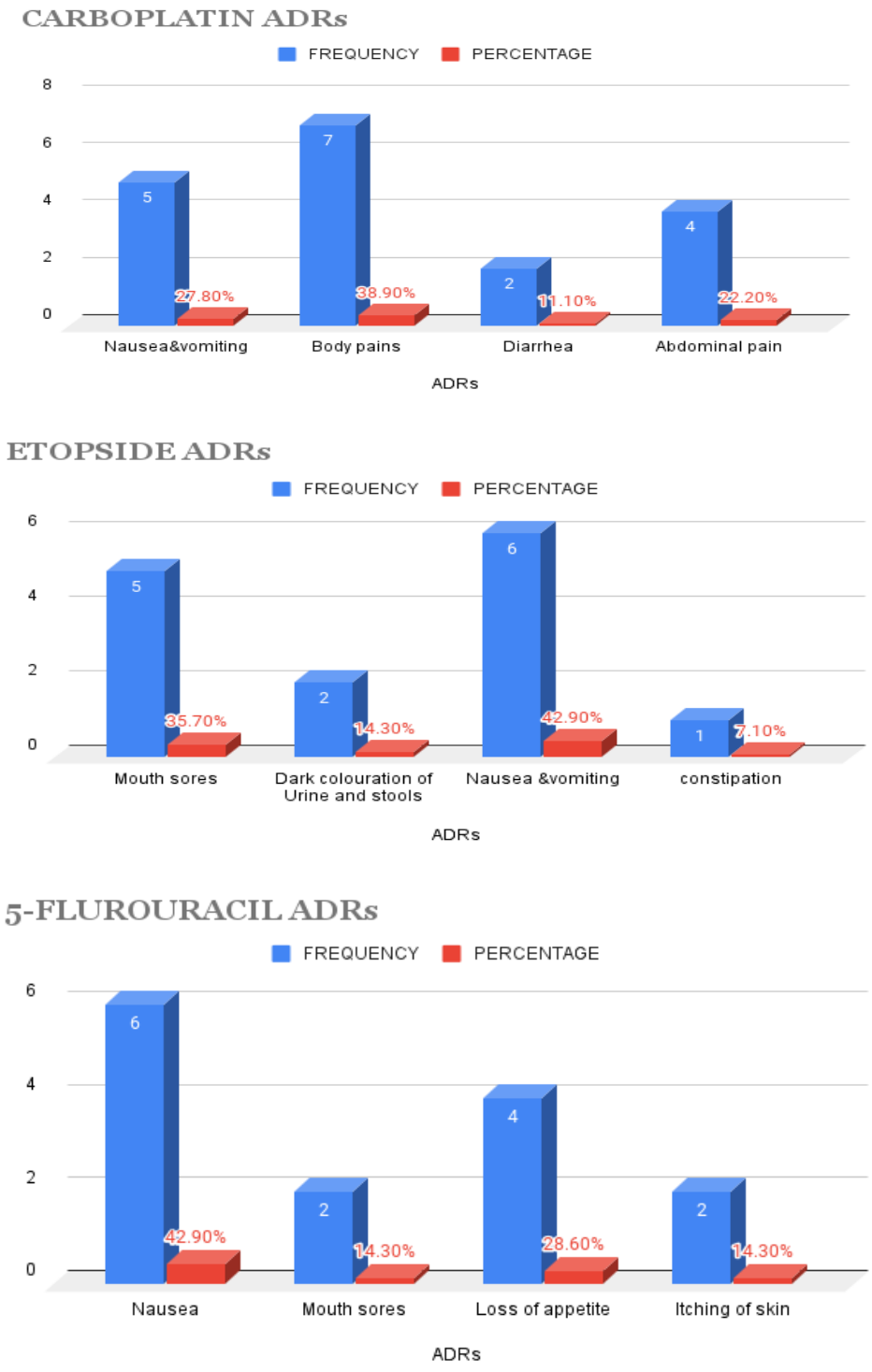


FIGURE No. 9: Bar graphs representing ADR distribution of cisplatin, paclitaxel, carboplatin, etoposide, and 5-fluorouracil

MEDICATIONS USED FOR TREATING ADRs:

80 cases among 145 chemotherapy cases showed 17 different types of ADRs. Among them, Nausea is the most common ADR followed by body pains and anaemia. Apart from that, some patients also experienced peripheral neuropathy, mouth sores, and allergic reactions. A list of the medications that are used to treat these ADRs was represented in the given table-12.

TABLE No. 11: Medications used for treating chemotherapy-induced ADRs

S.NO:	ADVERSE REACTION	MEDICATION USED
1.	Body pains	Tramadol, Paracetamol
2.	Bruising and bleeding	Tramadol
3.	Diarrhea	Loperamide
4.	Nausea and vomiting	Aprepitant, ondansetron, dexamethasone
5.	Anemia	Eptoin alpha
6.	Abdominal cramps	paracetamol
7.	Allergic reactions	Hydrocortisone, Promethazine
8.	Loss of appetite	Multivitamins
9.	Constipation	Lactulose
10.	Cough and hoarseness	Dexamethophan
11.	Injection. site pain	Tramadol, paracetamol
12.	Mouth sores	Benzydamine mouth

DISCUSSION

The study was carried out in an oncology department where the data was collected from MRD, cancer registry book, and patient case profile forms retrospectively and prospectively. The patients who all are being diagnosed with cancer are chosen for this study.

A total of 220 case subjects were analysed for the study. In this research, the participants were chosen based on the inclusion and exclusion criteria. for our study patient data were collected from the initial demographics to discharge summary, which includes demographics like age, gender, past medical and medication history, clinical features, diagnosis, risk factor,

chemotherapy drugs used, ADRs induced by chemotherapy drugs, medications used to treat chemotherapy-induced ADRs, height, weight, and BMI.

The age distribution of this analysis revealed that the greater number of patients belong to the age group of 54 - 64[27.5%] followed by bye age group 30 - 44[18.3%], age group of 44 - 54[17%], age group of 64 - 73[14.1%], age group of 25 - 34[9.2%], group of 73 - 83[7.8%], age group of 15 - 25[5%], age group of 83 - 85[1%]. This means the majority of patients who were affected by the cancer are between the age group of 54- 64 with 59 years as an average age.

The gender distribution of this analysis revealed that the maximum number of patients were female with a total of 111[51%] cases among 220 subjects where the man was with 107[49%] cases among 220 Which means females are more affected with cancer than males in the study region.

In this study among 220 case subjects, 23 different types of cancers were observed and analysed for the risk factors. among these cancers, the maximum number of patients are with cervical cancer [19.6%] which is followed by lung cancer[15.6%], stomach cancer[10.6], breast cancer[9.5%], Squamous cell carcinoma[4.5%], non-Hodgkin's lymphoma[4.5%], bone cancer[4.0%], tongue cancer[4.0%], prostate cancer[3%], rectal cancer[2.5%],pharyngeal cancer[2.5%], pancreatic cancer[2%], ovarian cancer[2%], vulvar cancer[2%], laryngeal cancer[2%], Hodgkin's lymphoma[2%], esophageal cancer[1.5%], buccal cancer[1.5%], brain cancer[1.5%], renal cancer[1.5%], adenocarcinoma[1%], blood cancer[1%], thyroid cancer[1%]. This means the majority of subjects are affected with cervical cancer and then followed by lung cancer.

Risk factors factors for each and every cancer were also analysed 23 different cancer types we found 21 different risk factors among which maximum number of cases with tobacco smoking[16%] followed by exposure to carcinogens[9.6%], alcohol[8.7%], Genetic changes[7.8%], PCOD[4.6%], Gutka[4.6%], age[3.7%], betel Quid[3.7%], oral contraceptives[3.7%], bacterial infection[3.7%], stomach polyps[3.2%], multiple full-term pregnancy[3.2%], exposure to sun[3.2%], viral infection[3.2%], autoimmune disorders[3.2%], HPV infection[3.2%], chemotherapy of another cancer[2.7%], poor oral hygiene[2.3%], no history of pregnancy[2.3%], obesity[2.3%].This analysis shows that the major risk factor which is causing cancer is tobacco smoking and then exposure to

carcinogens this is major because most of the subjects in the study work in the industry where there is a lot of exposure to carcinogens.

The major risk factor for cervical cancer was found to be pregnancy-related problems [26.8%], for lung cancer, tobacco smoking [35.7%], for stomach cancer, alcohol [30.8%], for breast cancer, age [36.8%] and postmenopausal changes [31.6%].

In this study among 220 cases, 145 subjects were treated with chemotherapy and the data was collected prospectively. The most commonly used chemotherapy drugs for treating different cancers in the study are cisplatin [27.8%], paclitaxel [22.8%]. Carboplatin [17.9%] etoposide [7.2%] 5-fluorouracil [6.1%] oxaliplatin [4.6%] when Christian [3.9%], cyclophosphamide [2.7%], doxorubicin [2.3%], docetaxel [1.9%], bleomycin[1.5%], without exit[1%]. This means cisplatin which is the Platinum-containing compound is used for treating the maximum number of cancers.

In this study among 220 cases 145 cases for chemotherapy among them, 80 cases showed chemotherapy-induced ADRs. There are about 17 different types of ADRs the most common ADR was found to be nausea with or without vomiting[14.3%] which is followed by body pains[11.8%], anaemia [10.1%], loss of appetite[9.2%], peripheral neuropathy[8.4%], alopecia[7.6%], breathing and bleeding[5.9%], allergy[5%], cough and hoarseness[4.2%], mouth sores[4.2%], abdominal pain[3.4%], injection site pe[2.5%] difficulty urinating[2.5%] diarrhoea[1.7%], constipation[1.7%]. This shows that a maximum number of subjects were suffering from nausea and vomiting followed by anemia because of chemotherapy-induced drugs.

The incidence rate of chemotherapy-induced ADRs was found to be 121.38. Chemotherapy-induced ADRs were mostly observed in the age group between 52-61yrs with 23.5% with an average age of 56yrs which is followed by 43-52yrs and 61-71yrs with a percentage of 18.5 each. Then 34-43yrs(9.9%),15-24yrs(7.4%), 80-85yrs(4.9%) and 71-80yrs(3.7%).

Among 80 cases of chemotherapy-induced ADRs, males had taken lead with 60% were females are with 40%.

9 different ADRs were observed when subjects are administered with Cisplatin among them Anemia (22.20%) was on top with followed by Alopecia(19.4%), Peripheral neuropathy(13.90%), Body pains(13.90%), Cough(11.10%), Dry skin(5.60%), Dark urine(5.60%), Loss of appetite(2.80%). For Paclitaxel 7 ADRs were observed where Allergic reactions (29.60%) and peripheral neuropathy(25.90%) ranking first two places followed by

Bleeding gums(18.50%), Muscle pains(11%), Anemia(7.40%), Injection site pain and Alopecia with 3.70%. For Carboplatin 4 different types of ADRs were observed among them Body pains(38.90%) was observed in more number subjects, then followed by Nausea and Vomiting(27.80%), Abdominal pain(22.20%), Diarrhea(11.10%), and Etoposide and 5-Fluorouracil, Nausea with or without vomiting was on the lead with 42.9% and 43% respectively which is followed by Mouth sores(35.70%), Dark discoloration of urine and stools(14.30%), Constipation(7.10%) for etoposide, and Loss of appetite(28.60%), Mouth sores(14.30%), and Itching of skin(14.30%) were observed when subjects are administered with 5-Fluorouracil.

In this study, some medications are used for treating chemotherapy-induced ADRs. which were Tramadol and Paracetamol for Body pains, Loperamide for Diarrhea, Ondansetron, Aprepitant, and Dexamethasone for Nausea and Vomiting, Eptoin Alpha for Anemia, Hydrocortisone and Promethazine for Allergic reactions, Lactulose for Constipation, Dexamethasone for Cough and Hoarseness, Benzydamine mouth for the Mouth sores, Tramadol and Paracetamol for Injection site pain.

CONCLUSION

In our study, the data which is collected from the initial demographics of the patient till discharge showed the most common type of cancer and common Risk factor which is responsible for cancer in this specified area. Apart from this we also found the highest affected age group and gender. The incidence rate of chemotherapy-induced ADRs, commonly occurring ADRs of different chemotherapy drugs were also determined. Age group and gender which are more affected by chemotherapy ADRs were determined along with their management. This study helps to target different groups of people who are at higher risk of developing cancer and preventive measures can be performed by modifying the risk factors along with following secondary prevention and chemoprevention strategies.

ACKNOWLEDGEMENT

This study was approved by the institutional ethics committee (IEC) at Malla Reddy Medical College for Women. This study was supported and guided by an Institutional guide at Malla Reddy Institute of Pharmaceutical Science and a Hospital guide at Malla Reddy Cancer Hospital and Research Institute.

CONFLICT OF INTEREST

Conflicts of interest declared none.

REFERENCES

1. World health organization, 3 march 2021, Cancer, viewed 3 June 2021, <https://www.who.int/news-room/fact-sheets/detail/cancer>
2. International Journal of Advanced Research(IJAR), 10 June 2019, CANCER IS NOT A SINGLE DISEASE, BUT A COLLECTION OF SEVERAL DISEASES, viewed 4 June 2021,< http://dx.doi.org/10.21474/IJAR01/9217>
3. American Association for Cancer Research, n.d., what is cancer? viewed 4 June 2021, <https://www.aacr.org/patients-caregivers/about-cancer/>
4. Verywellhealth, 23 March 2021, what is carcinoma in situ, and what does it mean? viewed 5 June 2021, <https://www.verywellhealth.com/definition-of-carcinoma-in-situ-2249071>
5. Bukhtoyarov OV, Samarin DM. Pathogenesis of cancer: Cancer reparative trap. Journal of Cancer Therapy. 2015 May 6;6(05):399.
6. American cancer society, 4 February 2021, Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries, viewed 7 June 2021, <https://acsjournals.onlinelibrary.wiley.com/doi/full/10.3322/caac.21660>
7. Start center for cancer care, 3 Dec 2020, Understanding the Stages of Cancer, viewed 7 June 2021, <https://www.thestartcenter.com/post/understanding-stages-cancer>
8. Asst. Prof. Dr. Chateen I. Ali Pambuk* and Fatma Mustafa Muhammad, Cancer Cause: Biological, Chemical, and Physical Carcinogens, Merit Research Journal of Medicine and Medical Sciences (ISSN: 2354-323X) Vol. 6(9) pp. 303-306, September 2018
9. NATIONAL CANCER INSTITUTE, 16 May 2019, symptoms of cancer, viewed 7 June 2021, <https://www.cancer.gov/about-cancer/diagnosis-staging/symptoms>
10. Merrill RM, Capocaccia R, Feuer EJ, Mariotto A. Cancer prevalence estimates based on tumor registry data in the Surveillance, Epidemiology, and End Results (SEER) Program. International journal of epidemiology. 2000 Apr 1;29(2):197-207.
11. Al-Janabi AA, Naseer ZH, Hamody TA. Epidemiological study of cancers in Iraq-Karbala from 2008 to 2015. International Journal of Medical Research & Health Sciences. 2017;6(1):79-86.
12. Belachew SA, Erku DA, Mekuria AB, Gebresillassie BM. A pattern of chemotherapy-related adverse effects among adult cancer patients treated at Gondar University Referral Hospital, Ethiopia: A cross-sectional study. Drug, healthcare and patient safety. 2016;8:83.
13. Deepa KV, Venghateri JB, Khajanchi M, Gadgil A, Roy N. Cancer epidemiology literature from India: Does it reflect the reality?. Journal of Public Health. 2020 Dec;42(4):e421-7.
14. Oliveria SA, Christos PJ, Berwick M. The role of epidemiology in cancer prevention. Proceedings of the Society for Experimental Biology and Medicine. 1997 Nov;216(2):142-50.
15. Chopra D, Rehan HS, Sharma V, Mishra R. Chemotherapy-induced adverse drug reactions in oncology patients: a prospective observational survey. Indian journal of medical and pediatric oncology: official journal of Indian Society of Medical & Paediatric Oncology. 2016 Jan;37(1):42.
16. Chan A, Soh D, Ko Y, Huang YC, Chiang J. Characteristics of unplanned hospital admissions due to drug-related problems in cancer patients. Supportive care in cancer. 2014 Jul;22(7):1875-81.
17. Lavan AH, O'Mahony D, Buckley M, O'Mahony D, Gallagher P. Adverse drug reactions in an oncological population: prevalence, predictability, and preventability. The oncologist. 2019 Sep;24(9):e968.
18. Lau PM, Stewart K, Dooley M. The ten most common adverse drug reactions (ADRs) in oncology patients: do they matter to you?. Supportive care in cancer. 2004 Sep;12(9):626-33.
19. Ko Y, Gwee YS, Huang YC, Chiang J, Chan A. Costs and length of stay of drug-related hospital admissions in cancer patients. Clinical therapeutics. 2014 Apr 1;36(4):588-92.
20. Ramasubbu SK, Pasricha RK, Nath UK, Das B. Frequency, nature, severity and preventability of adverse drug reactions arising from cancer chemotherapy in a teaching hospital. Journal of Family Medicine and Primary Care. 2020 Jul;9(7):3349.
21. Thakur JS, Rao BT, Rajwanshi A, Parwana HK, Kumar R. Epidemiological study of high cancer among a rural agricultural community of Punjab in Northern India. International journal of environmental research and public health. 2008 Dec;5(5):399-407.

22. Raj P, Hohenadel K, Demers PA, Zahm SH, Blair A. Recent trends in published occupational cancer epidemiology research: results from a comprehensive review of the literature. American journal of industrial medicine. 2014 Mar;57(3):259-64.
23. Miller DS. Cancer epidemiology and prevention. Chronic Diseases and Injuries in Canada. 1997;18(2):1G.
24. Hublin C, Kaprio J, Partinen M, Koskenvuo M, Heikkila K, Koskimies S, Guilleminault C. The prevalence of narcolepsy: an epidemiological study of the Finnish Twin Cohort. Annals of neurology. 1994 Jun;35(6):709-16.
25. Lindelöf B, Sigurgeirsson B, Tegner E, Larkö O, Johannesson A, Berne B, Christensen OB, Andersson T, Törngren M, Molin L, Nylander-Lundqvist E. PUVA and cancer: a large-scale epidemiological study. The Lancet. 1991 Jul 13;338(8759):91-3.
26. Vessey MP, Baron J, Doll R, McPherson K, Yeates D. Oral contraceptives and breast cancer: final report of an epidemiological study. British journal of cancer. 1983 Apr;47(4):455-62.
27. Li J, Zhang BN, Fan JH, Pang Y, Zhang P, Wang SL, Zheng S, Zhang B, Yang HJ, Xie XM, Tang ZH. A nation-wide multicenter 10-year (1999-2008) retrospective clinical epidemiological study of female breast cancer in China. BMC Cancer. 2011 Dec;11(1):1-1.
28. Yun TK, Choi SY, Yun HY. Epidemiological study on cancer prevention by ginseng: are all kinds of cancers preventable by ginseng?. Journal of Korean medical science. 2001 Dec;16(Suppl): S19.
29. Belachew SA, Erku DA, Mekuria AB, Gebresillassie BM. A pattern of chemotherapy-related adverse effects among adult cancer patients treated at Gondar University Referral Hospital, Ethiopia: A cross-sectional study. Drug, healthcare and patient safety. 2016;8:83.
30. Toporcov TN, Wünsch Filho V. Epidemiological science and cancer control. Clinics. 201.