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Clinical Study of Chemotherapy Induced Cardiotoxicity In A Tertiary Care Hospital

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Introduction

Cardiotoxicity' encompasses a spectrum of adverse cardiac effects experienced by cancer patients during and after receiving antineoplastic agents. The improvement of early diagnosis and timely cancer treatments has resulted in an improvement of the cancer survival rate in the last decade with growing population of cancer survivors. The damage to cardiovascular system from chemotherapy in many cases is more significant from the underlying disease. Cancer therapy-related cardiovascular complications are primarily classified into three groups, such as vascular disorders, cardiac structural concerns, cardiac dysfunction and heart failure. The major group of cardiotoxic chemotherapeutic agents are anthracyclines, inhibitors of epidermal growth factor receptor type 2 (anti – HERR2), antimetabolites, microtubule inhibitors, protease inhibitors, platinum based chemotherapeutic agents and angiogenesis inhibitors. Cardiotoxicity can have a profound impact on quality of life and survivorship and can affect the oncological outcomes. The following study was conducted to study the clinical profile of cardiotoxicity, including the symptoms, signs and the chemotherapeutic agents used and to study its correlation with 2DEchocardiography.

Aims and Objectives

A. To study the prevalence of cardiac involvement in cancer patients on chemotherapy.

B. To study clinical features and 2DEchocardiography correlation of cardiac involvement in cancer patients on chemotherapy.

C. To study the etiological agents causing cardiotoxicity and its outcome in cancer patients.

Inclusion criteria

- Cancer patients on chemotherapy having age > 12 years visiting oncology OPD at tertiary care hospital for treatment
- Cancer patients admitted to tertiary care hospital for cardiac complaints like chest pain, palpitations, syncope or breathlessness.
- Patients willing to give consent and ready to be the part of the study.

Exclusion criteria

- Cancer patients not willing to give consent.

- Cancer patients age below <12 Years.
- Cancer patients which are known case of Ischemic heart disease or other heart conditions will not be included in the study.

Study Design

Hospital based cross sectional observational study, conducted in a tertiary care hospital over a period of 18 months. 61 patients were included in this study.

Patient with history of malignancy receiving chemotherapy at day care centre OPD and IPD

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Satisfies Inclusion Criteria.

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Detailed history of symptoms, chemotherapeutic agents used along with general examination and detailed CVS examination.

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2Dechocardiography

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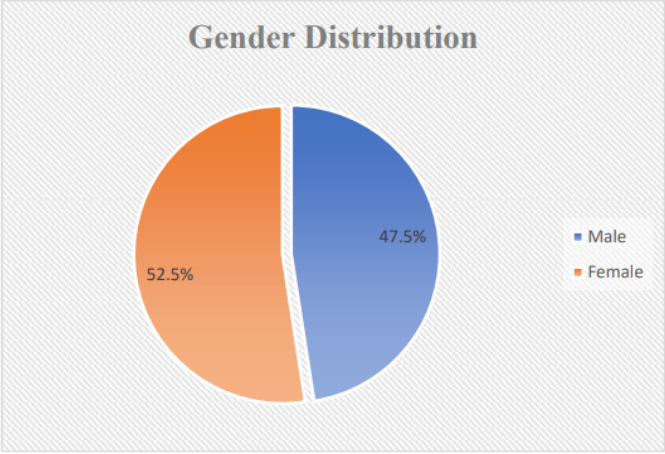
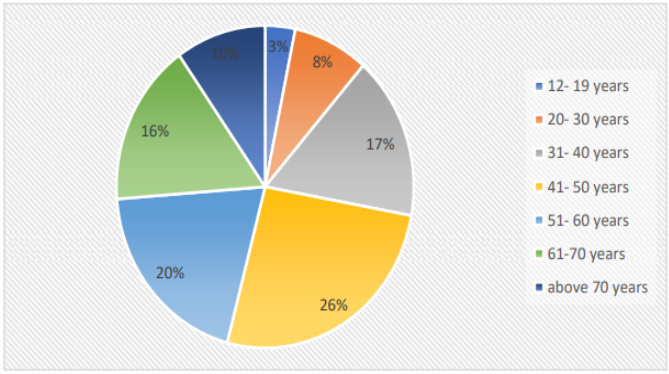
Assessment of outcome and correlation with the symptoms.

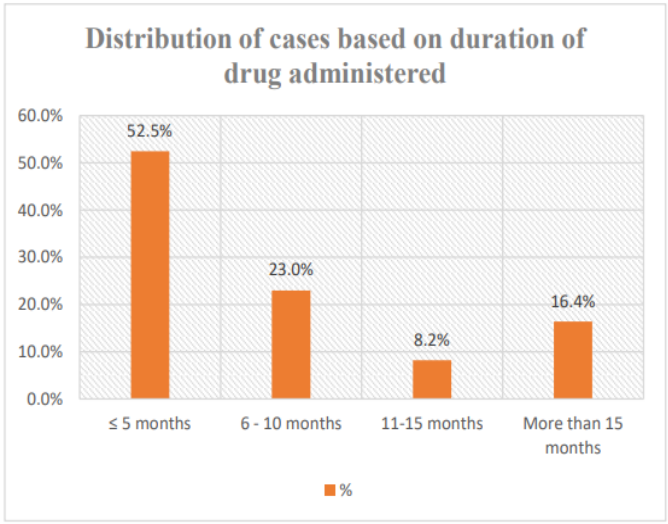
Gender distribution of all cases: Out of the 61 cancer patients, 29 patients were male and 32 were female. Thus we found female preponderance in our study.



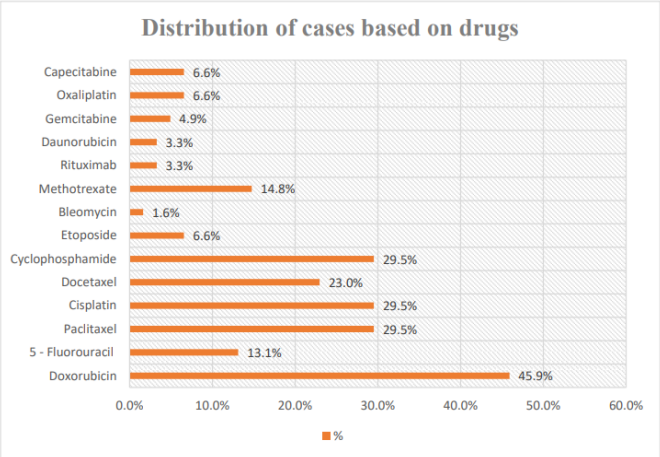
Age distribution of all cases: The age group of all cases were stratified into various age groups as shown in above table. The number patients in 12 – 20, 21- 30, 31-40, 41-50, 51-60, 61-70, > 70 were 2,5,10,16,12,10,6. Hence the maximum number of patients were in the age group of 41-50 years.



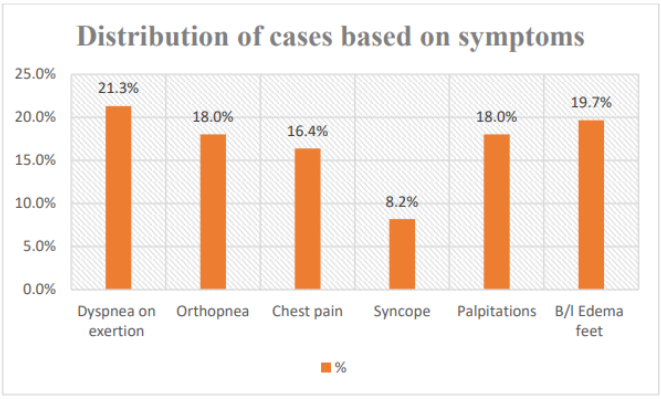
Distribution of cases based on duration of drug administered: Duration of chemotherapeutic drugs were studied in the study with duration of less than 5 months, 6 to 10 months, 11 to 15 months and more than 15 months as 32, 14, 10, 5 respectively. Majority of cases were found to have cardiotoxicity caused within 5 months of starting chemotherapy and minimum were found in duration more than 15 months. Hence in the initial phases of chemotherapy patients experience more cardiotoxicity.



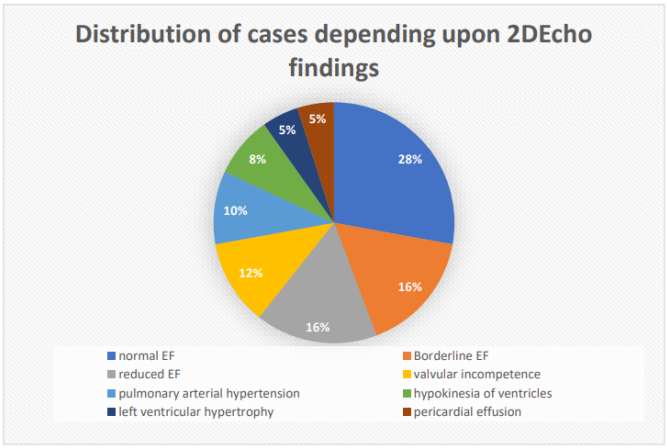
Distribution of cases based on different chemotherapeutic agents



Distribution of cases based on symptoms



Distribution of cases depending upon the 2DEcho Findings



Observation and results

1) The prevalence of cardiotoxicity among the patients on chemotherapy in our tertiary care center was found to be 5.3%.

2) In our study female preponderance was present, Female 52.5% were found to have more cardiotoxicity than males 47.5%

3) Advanced age was associated with increased prevalence of cardiotoxicity.

4) Significant cardiotoxicity was observed during initial phase of chemotherapy within 5 months of initiation 32.5%.

5) Breathlessness on exertion patients was the commonest symptom among the patients.

6) Mitotic inhibitors like paclitaxel and docetaxel were found to cause cardiotoxicity in majority (60%) cases. While Anthracyclines like Doxorubicin (45.9%) and Daunorubicine (3.3%) were found to cause cardiotoxicity in 49% of study cases in second place followed by alkylating agents like Cisplatine 18% and cyclophosphamide 18%.

7) A higher cumulative dose (≥1 g) of chemotherapeutic agents was associated with higher prevalence of cardiotoxicity.

8) 2DEChocardiography finding were suggestive of borderline ejection fraction in 16.39% and reduce d ejection fraction in 16.4% equally while pulmonary arterial hypertension was demonstrated in 9.8% of cases, 8.2% had ventricular hypokinesia and 4.95 had pericardial effusion.

9) In our study, 57.4% of cases had improved and are on regular follow up and out of 3 patients 2 patients died of arrhythmias and 1 patient died due to congestive cardiac failure.

Discussion

With an aim to study the clinical features of patients receiving chemotherapy at tertiary care hospital, we began the screening of study population from June 2022. It was observed that the prevalence of cardiotoxicity is 5.3% in our study. As per the definition, cardiotoxicity is defined as toxicity that affects the heart, now that affection can be in the form of myocarditis, pericarditis, conductivity defects, myocardial infarction or cardiomyopathies. The major groups of chemotherapeutic agents are Anthracyclines, microtubule inhibitors, platinum based chemotherapeutic drugs, proteasome inhibitors and angiogenesis inhibitor. According to symptomatology, most of the patients suffering from cardiotoxicity were presented with breathlessness on exertional activities 21.3%, bilateral lower limb swelling 19.7%, palpitations 18% and syncope 8.2% while only 16.4% patients had chest pain. Out of 61 patients, it was found that cardiotoxicity was seen more in patients being treated with mitotic inhibitor like Paclitaxel (29.5%) and Docetaxel (23%) total 60%, followed by alkylating agents like cyclophosphamide (29.5%) and cisplatin (29.5%) and then followed by anthracycline group of drugs like Doxorubicin and Daunorubicin. We conducted 2DEchocardiography in patients receiving chemotherapy which was suggestive of normal ejection fraction in 27.83% cases, borderline ejection fraction in 16.39%, reduced ejection fraction in 16.4%, valvular incompetence in 11.5%, pulmonary arterial hypertension in 9.8%. ventricular hypokinesia in 8.2%, left ventricular hypertrophy and pleural effusion in 4.9% of cases. In our study at tertiary care hospital 57.4% of cases having cardiotoxicity were had significant improvement, as the patients were in continuous follow up and regular monitoring of vitals and history taking was done along with examination for the new signs of cardiac failure. The patients were also subjected to the regular laboratory and 2DEcho monitoring for evaluation of cardiac function, as well as addition of cardioprotective agents according to need.

Conclusion

- In present study, the prevalence of chemotherapy induced cardiotoxicity in symptomatic patients receiving chemotherapy was 5.3%.
- The clinical symptoms and signs of cardiotoxicity in cancer patients receiving chemotherapy were correlated well with the 2DEcho findings.
- The earliest symptom was found to be breathlessness on exertion.
- Mitotic inhibitors, platinum compounds and Anthracyclines were found to have a significant role in producing chemotherapy induced cardiotoxicity in cancer patients. Increased prevalence of cardiotoxicity was seen in patients taking higher cumulative doses.
- Cardiotoxicity is precipitated more with advanced age and in early months of initiation.

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